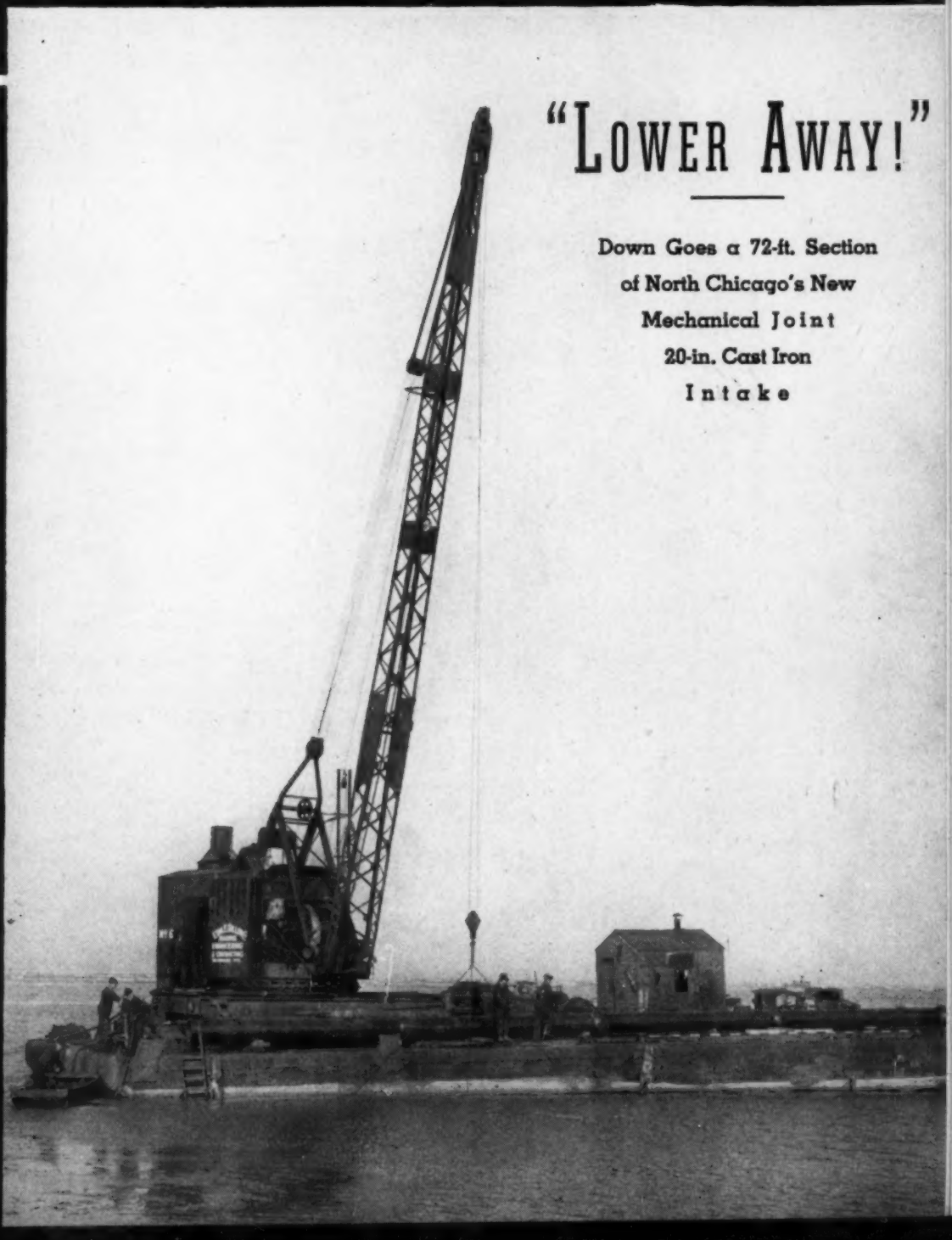
WATER WORKS & SEWERAGE

SEPTEMBER 1945

"LOWER AWAY!"

Down Goes a 72-ft. Section of North Chicago's New Mechanical Joint 20-in. Cast Iron Intake



Get Chapman's Sluice Gate Handbook

Save Time and Money by Selecting Chapman Standards

Look through Chapman's Sluice Gate Handbook. You usually can find what you want—without the expense or waiting required with specially built equipment. And Chapman gives you quicker installation because interchangeable stems and couplings need not be match-marked.

Chapman can also give any type of operating control you may desire... manual, hydraulic cylinder, or Motor Unit. Write us today.

THE CHAPMAN VALVE MFG. CO.

INDIAN ORCHARD, MASS.

WATER WORKS & SEWERAGE, September, 1945, Volume 92, Number 9. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.

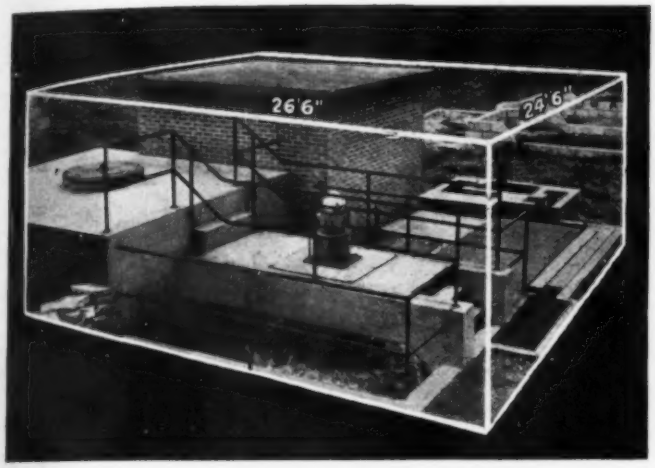
CHICAGO "PACKAGE" SEWAGE PLANTS

GIVE CONSISTENT COMPLETE TREATMENT YEAR AFTER YEAR

5-YEAR OPERATION RECORD OF TYPICAL CHICAGO "PACKAGE" SEWAGE PLANT

Year	Avg. Daily Flow 1,000 G.P.D.	Avg. Daily B.O.D.			% Reduction			Avg. Daily Suspended Solids			% Reduction		
		Raw	Primary	Final	Avg. for Year	Min. Month	Max. Month	Raw	Primary	Final	Avg. for Year	Min. Month	Max. Month
1940	39	367	304	12	96.7	95.8	97.5	179	60	5	97.2	96.1	97.6
1941	71	325	259	12	96.3	95.1	98.0	178	86	8	95.5	93.4	98.7
1942	67	339	299	17	95.0	94.5	98.0	192	89	9	95.2	91.5	98.7
1943	69	461	397	18	96.1	91.3	98.0	199	87	7	96.5	94.0	98.2
1944	59	421	408	31	92.7	88	95.0	217	97	11	95.0	86.7	98.3

This data is based on composite samples taken semi-weekly continuously throughout each year—Not grab samples during periods of good treatment. It shows that there is no accumulation of B.O.D. going into the receiving stream.



Chicago "Package" Sewage Treatment Plant at Mt. Mercy Sanitarium, Dyer, Ind. Design Capacity, 20,000 GPD. The stationary engineer of the sanitarium also operates the sewage treatment plant. The plant is composed of a Comminutor, primary tank, Combination Aerator-Clarifier, pump house, digester and sludge beds.

OVER 100 PLANTS IN SUCCESSFUL OPERATION DURING PAST 10 YEARS

The proven successful performance shown by this 5-year operation record is typical of Chicago "Package" Plants. Equipment that produces results like that is not born overnight. It is the result of good engineering, painstaking design, development, and years of experience.

This background of experience and successful performance of Chicago "Package" plants is protection to engineers and municipalities against unsuccessful imitations. Ingenious patented features developed during the past ten years are responsible for simple operation and successful performance.

Chicago "Package" plants are for small municipalities, airports, housing projects, institutions and industrial plants. The first cost is low. They require a minimum of operating supervision, produce a sparkling clear effluent, are free from flies, odors or unsightly appearances and may be safely located near dwellings.

Write for full description and discussion, facts and figures for this type of plant, which has been specifically developed for the characteristic small community sewage flow and strength.

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

2349 WOLFRAM STREET — **CHICAGO 18, ILLINOIS**

Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs, Water Seal Pumping Units, Samplers,

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

HIGHER OPERATING EFFICIENCIES

at 15... or 150 MGD Flow

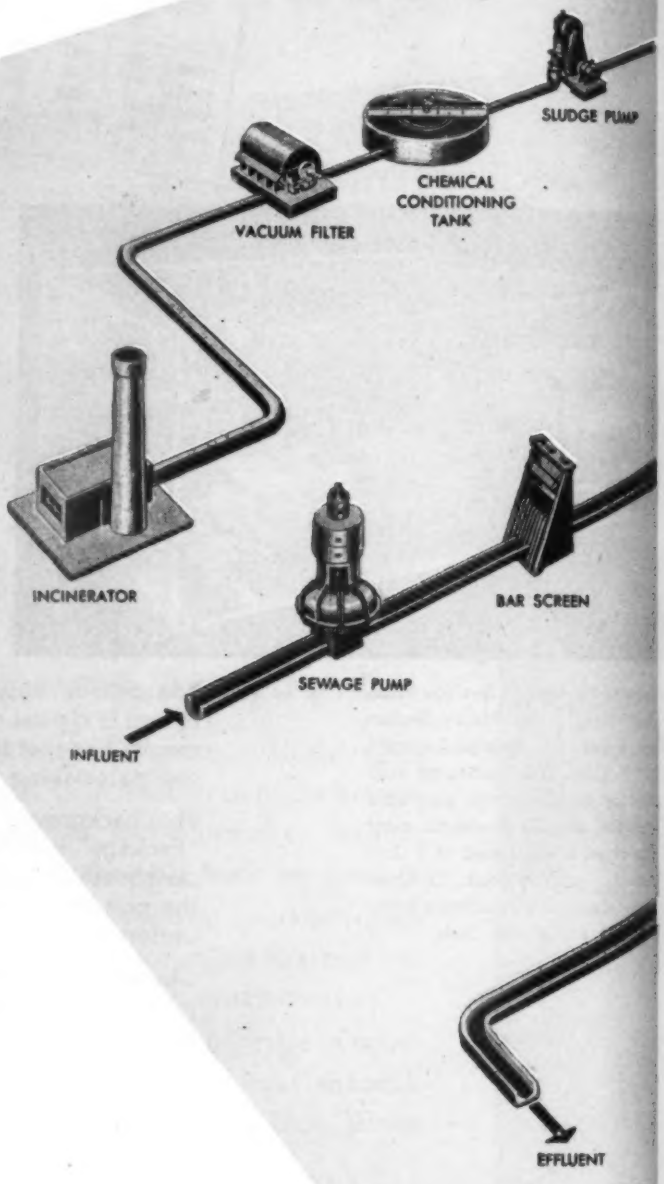
... obtained with Westinghouse synchronous motor pump drive and associated electrical drives co-ordinated from influent to effluent.

To provide adjustable pumping capacity to match variable heads and sewage flows in the Buffalo Sewage Disposal Plant, two of six pumps were equipped with dual Westinghouse synchronous motors, both on the same shaft. This made possible the selection of either of two speeds, with resultant change in pumping capacity. It assured the high efficiency and power factor inherent in synchronous motors.

The dependability and efficiency of Westinghouse motor drives have been demonstrated in scores of sewage treatment plants. In the modern Buffalo Sewage Disposal Plant, for example, Westinghouse supplied 335 electric motors . . . of all types, completely co-ordinated by Westinghouse control boards and switchgear for highly efficient handling of a 150 MGD flow. One of the two-speed synchronous motor sewage pump drives is illustrated on the opposite page.

Whether the drive requires ¼ horsepower, or 5,000 —50 motors or 500—Westinghouse can help you select and apply the right motor drive and control . . . by a co-ordinated service which includes all equipment from power transformers to pushbuttons.

Westinghouse today is helping many cities in their "Blueprint Now" plans. Ask Westinghouse to be your electrical partner at the planning board. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94689

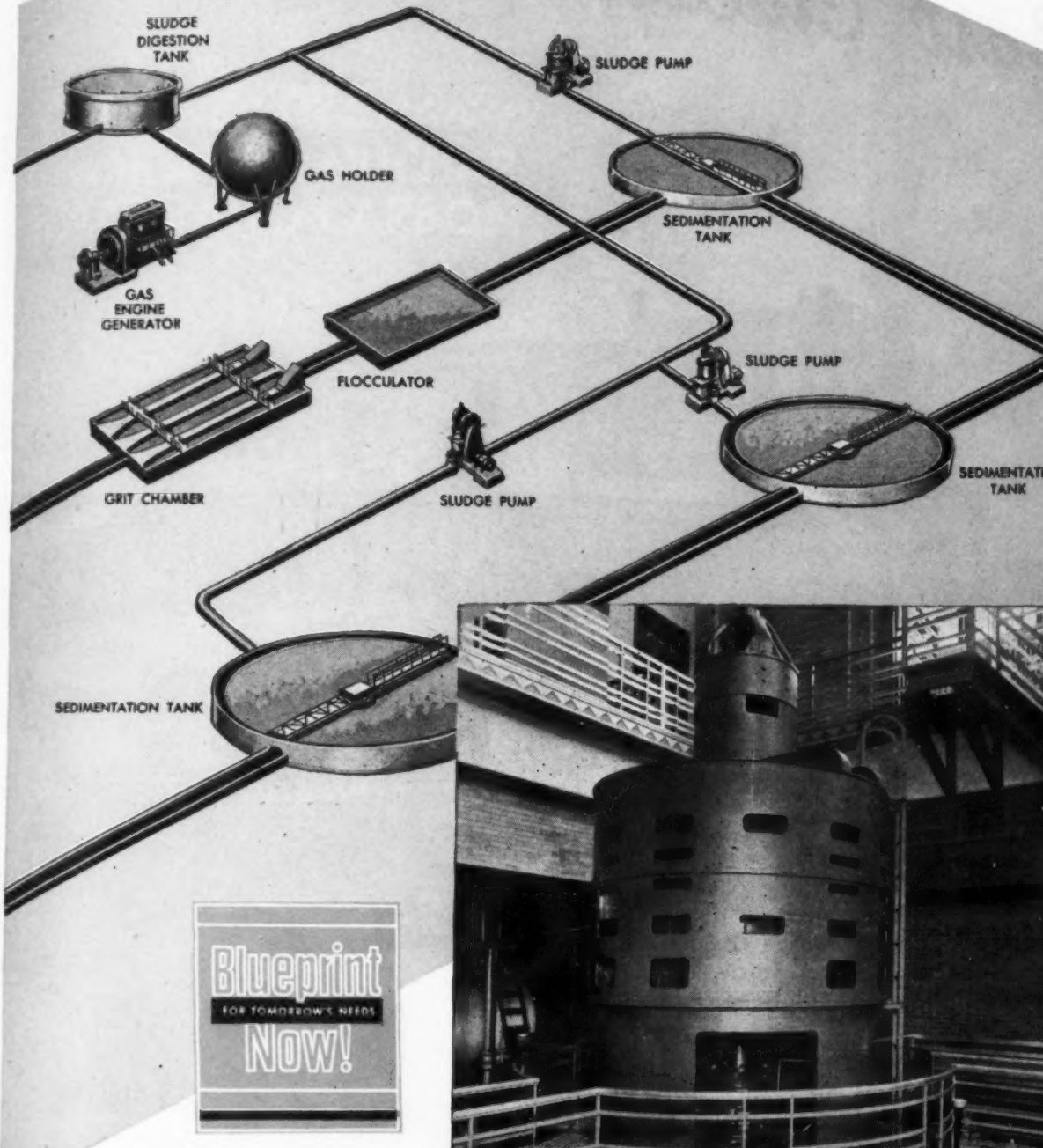


Westinghouse

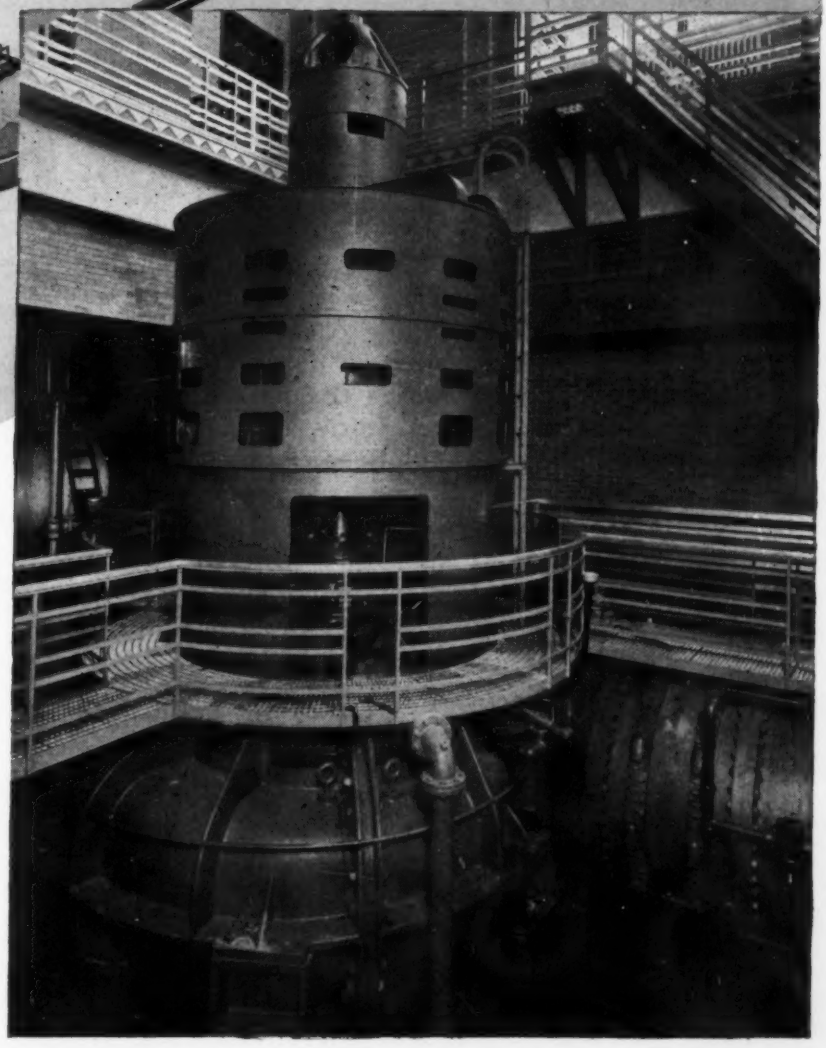
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

Complete Electrical Equipment for Sewage Works

THERE IS A WESTINGHOUSE MOTOR FOR ANY SEWAGE WORK DRIVE



Blueprint FOR TOMORROW'S NEEDS Now!



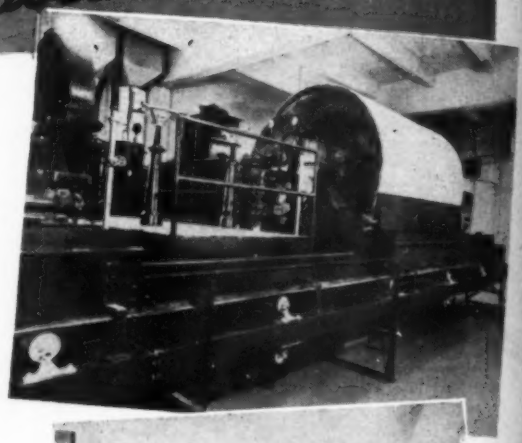
Westinghouse two-speed vertical synchronous motor driving a 60" vertical volute bottom suction sewage pump with a 60" automatic butterfly discharge valve—at Buffalo, New York, Sewage Disposal Plant. Motor rating is 550/375 hp, 180/157 rpm, 4160 volts, 3 phase, 60 cycles. Pump rating is 120 MGD at 23 feet TDH at 180 rpm, and 100 MGD at 18 feet TDH at 157 rpm.

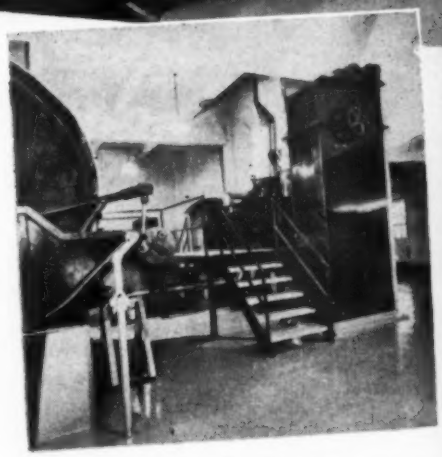
WESTINGHOUSE

East Chicago's Modern Sewage Disposal Plant

Eimco is proud to have played a part in providing a substantial portion of the sewage treatment equipment for the modern sewage disposal plant built by the progressive City of East Chicago, Indiana. To the city administration, whose vision and careful planning made possible this splendid contribution to municipal sanitation; — to Russell B. Moore & Company, consulting engineers;—to McKay & Hasse, contractors, our congratulations on having conceived and built this unit. Population growth and space economy have been carefully considered — every safeguard to Public Health provided — and only the finest quality-built efficient machinery and equipment installed.

Eimco engineers welcome an opportunity to aid in planning Sewage Disposal Plants for Municipalities and Industry — and offer a complete line of Vacuum Filters and accessories.





Above shows two 8′ dia. x 10′ face Eimco Sewage Filters.

Lower View shows filter with shower pipe connection, platform, mix tank and bucket elevator, all manufactured by Eimco.

EIMCO

THE EIMCO CORPORATION

Executive Offices and Factories: Salt Lake City 8, Utah
Branches: New York, Chicago, El Paso, Sacramento, St. Louis

A 96

Aqua Nuchar Activated Carbon is an efficient and economical means of keeping your water free from objectionable tastes and odors. Aqua Nuchar Activated Carbon works on the adsorptive principle . . . trapping odorous impurities in the many faceted surface of each microscopic particle of carbon.

You can never tell when purification problems will arise in your raw water supply. Join the hundreds of communities using Aqua Nuchar Activated Carbon. With heavy rains flushing out stagnant and swampy areas on your watershed, be prepared for overnight changes in your water treatment.

Aqua Nuchar can be delivered to every American city on short notice. You'll find stocks of Aqua Nuchar Activated Carbon located at strategic points . . . ready to serve you. Get in the swim with Aqua Nuchar . . . the activated carbon with maximum adsorptive power to make your water more palatable.

Aqua Nuchar has been used in over 1,200 water treatment plants throughout this country and Canada. If you are not a regular user, you are cordially invited to "get into the swim."

INSURES PALATABLE NUCHAR DRINKING WATER

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De Laval Labyrinth Wearing Rings contribute in a large measure to sustaining the high efficiency of De Laval pumps. The large clearance, tortuous labyrinth passage reduces leakage to a minimum and maintains ample running clearances under all conditions.

For sustained efficiency and reduced maintenance costs look for De Laval Labyrinth Wearing Rings when buying centrifugal pumps.

3235

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS and COMPRESSORS • IMO OIL PUMPS

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STEAM TURBINE COMPANY · TRENTON 2, NEW JERSEY

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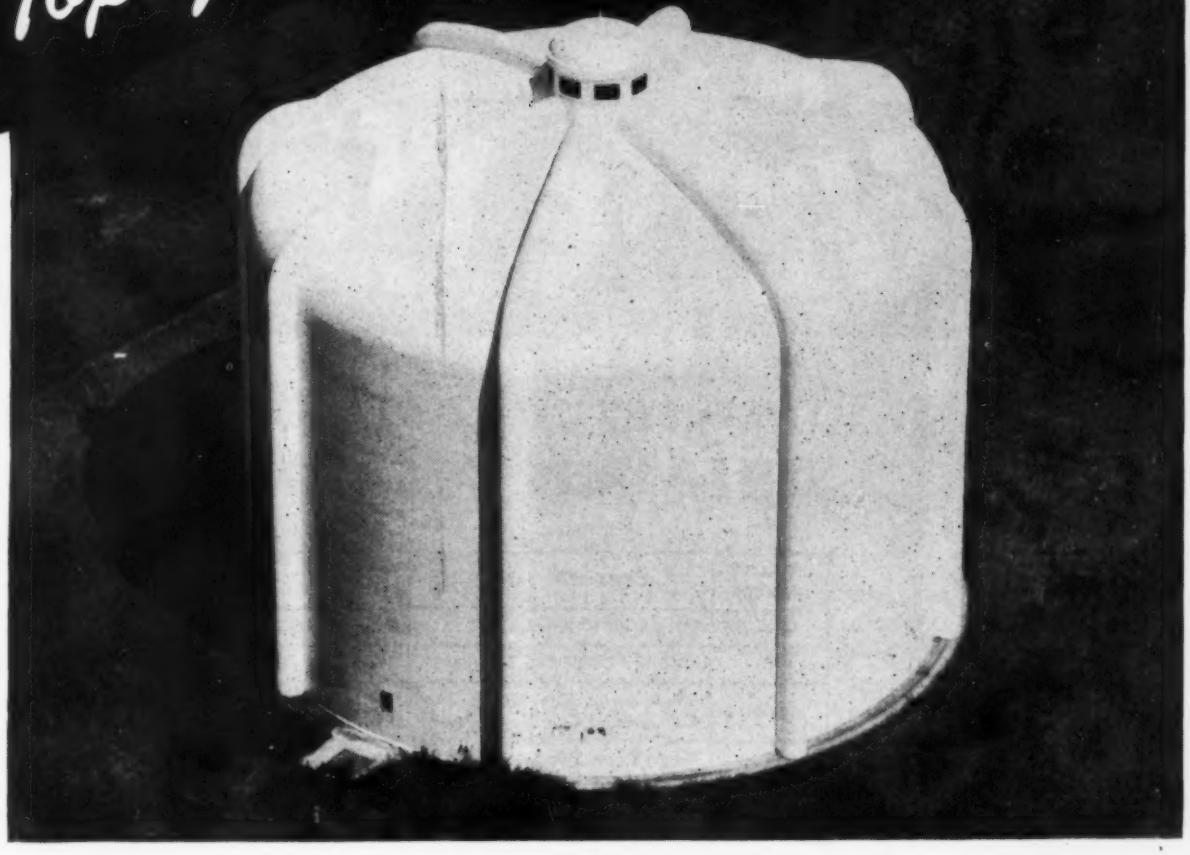
Tulsa Utilizes *Topography*



. . . TO MAINTAIN SERVICEABLE PRESSURE IN WATERWORKS SYSTEM

The development, during the decade from 1930 to 1940, of the southeastern portion of the City of Tulsa, Oklahoma, where transmission mains in the waterworks system were not large enough to handle peak demands, caused distribution pressures in that section to drop as low as ½ lb. per sq. in. during peak load periods. To correct this condition, a 2,500,000-gal. steel reservoir, utilizing a difference in elevation of the ground level, was installed at the highest point in the area.

The reservoir, acting like an elevated tank in a level area, is filled during periods of minimum demand. During peak periods, the water that is accumulated feeds back into the mains, maintaining a minimum pressure of 20 lbs. per sq. in. Normally the reservoir supplies about 1,000,000 gals. per day for domestic service. The remaining 1,500,000 gals. capacity provide a reserve for fire protection.

The special design of the reservoir was used as the reservoir is located adjacent to a residential section. It is of welded construction, with eight pilasters extending up the shell at equi-distant points and over the ellipsoidal roof to an ornamental cupola at the center.

If you are planning improvements in your water distribution system, write our nearest office for quotations on storage facilities.

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New York 6.....3390-165 Broadway Bldg.
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DIAPHRAGM PUMPS
DRAINAGE PUMPS
PORTABLE PUMPS

TIME-SAVING DATA ON
DEMING PUMPS

CATALOG NUMBER	TYPE OF PUMP	CAPACITY RANGE
4700-B	Deep Well Turbines	15 to 3000 G.P.M.
4701	Minuturb Deep Well Turbines	15 to 80 G. P. M.
4200	Single-Stage, Side Suction, Two Ball Bearing Centrifugal Pumps	10 to 3600 G.P.M.
4007	Single Stage, Side Suction, Single Ball Bearing Centrifugal Pumps	10 to 3600 G.P.M.
4302	Motor Mount Centrifugal Pumps	5 to 650 G. P. M.
5003	Single-Stage, Split Case Centrifugal Pumps	Up to 5000 G.P.M.
3900-A	½, ¾, 1 and 1½ Inch Side Suction Single Ball Bearing Centrifugal Pumps	2 to 80 G. P. M.
3000	Self-Priming Centrifugal Pumps (Portable and Stationary types)	10 to 300 G.P.M.
1000	Mine Dewatering Pumps	Wide Range
4604	Sump Pumps. Vertical types	10 to 3200 G.P.M.
300-B	Triplex Power Pumps—Single Acting	Wide Range
Catalog "E"	Water Systems—All types	All capacities
Catalog "33"	Complete Catalog. General line	All capacities

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THE DEMING COMPANY · SALEM, OHIO

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CHLORINATED LIME

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MOISTURE, NOT MORE THAN 5%

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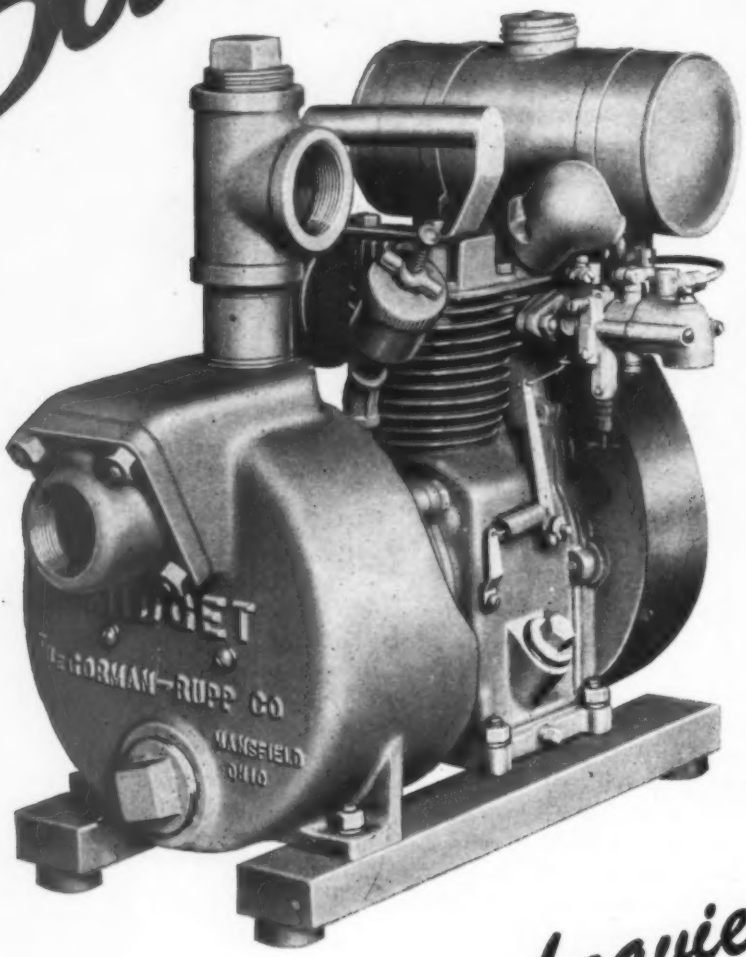
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS • WYANDOTTE • TACOMA

3000 gallons per hour



and no bigger or heavier than a tool kit

WHAT DO YOU WANT IN A PUMP?

PORTABILITY?

– There's a Gorman-Rupp pump no bigger or heavier than a tool kit that will deliver 3,000 gallons per hour.

RUGGEDNESS?

– It's not uncommon for a Gorman-Rupp to run 60 days or more without interruption.

CAPACITY?

– You can get Gorman-Rupp pumps up to ratings of 125,000 gallons per hour.

RELIABILITY?

– You can't clog a Gorman-Rupp with any muck or solid that will pass the intake.

SIMPLICITY?

– All Gorman-Rupp pumps are full automatic self-priming. Start the motor and you start the water.

EFFICIENCY?

– By actual test it has been demonstrated that Gorman-Rupp pumps have not been equalled in pumping capacity for power or size. They are streamlined inside, where streamlining counts.

Ask what you want of a Gorman-Rupp pump – you will get more for your dollar for a longer period of time.

GORMAN-RUPP PUMPS
UNSURPASSED FOR PUMPING FAST
ARMY NAVY

THE GORMAN-RUPP COMPANY

MANSFIELD • OHIO

Sustained ACCURACY—

to a Trickle—and to a Maximum Capacity Flow!

EVERY fractional cubic foot of water that flows through a Badger Water Meter is recorded faithfully — whether the unit be a large Badger Compound Meter or a ⅝-inch Badger Disc Meter.

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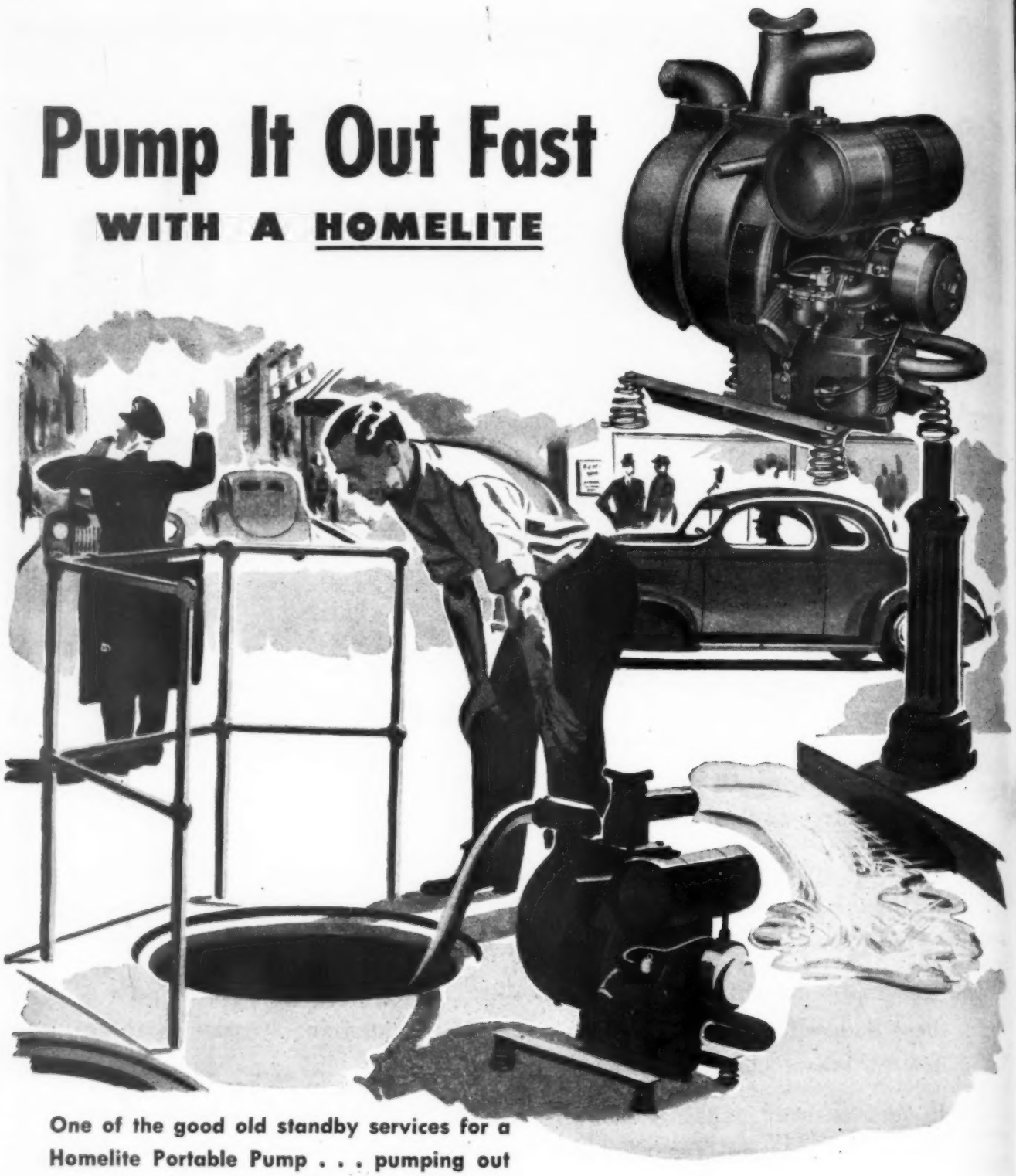
Pump It Out Fast

WITH A HOMELITE



One of the good old standby services for a Homelite Portable Pump . . . pumping out manholes. Fast . . . capable of pumping 15,000 gallons per hour . . . a Homelite dries out a manhole in no time. It keeps seepage down to strainer level. Gasoline-engine-driven it needs no manual attention. And you can depend on it always.

Homelite gasoline-engine-driven pumps are small enough for a man to carry (they weigh only 88 pounds), but big enough for heavy-duty pumping. Moreover, due to the extreme simplicity of the design of these pumps and the special materials that we have put into them, they'll work longer and with less trouble and maintenance. Send for complete information.

Homelite Corporation

Portable

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Pure Water

made safe through the use of

DIAMOND LIQUID CHLORINE

CHLORINE

An important job—safeguarding the purity of water supply—is aided materially by the dependable uniformity and purity of DIAMOND LIQUID CHLORINE.

In the manufacture of DIAMOND LIQUID CHLORINE, all processes are under accurate control at all times, assuring consistently high quality of the finished product. For complete satisfaction, specify DIAMOND.

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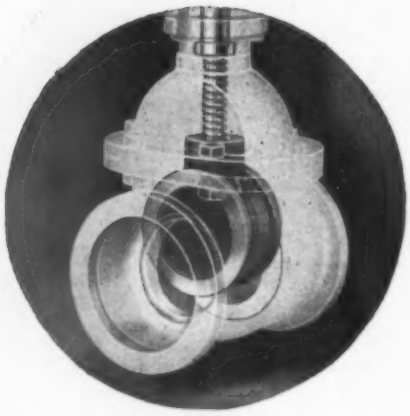
Proved by the Past—Fit for the Future

In the last analysis, the best indication of future service in water works equipment is its past record. Through the years — changing systems, higher pressures, lower budgets, wartime emergency— Ludlow Valves, Gates and Hydrants have served efficiently and faithfully. You may continue to rely on them for constant service, low upkeep, resistance to wear and fewer replacements. You may rely, too, on Ludlow engineers to consider your problems their own, making honest recommendations and giving accurate estimates.

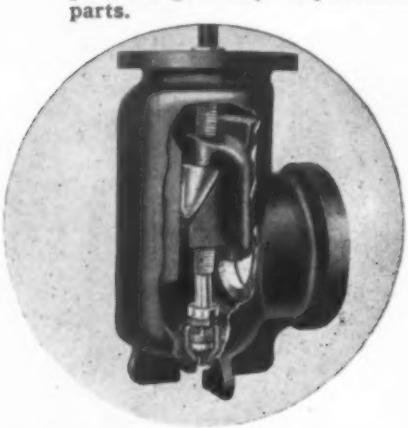
Write today for full information



LUDLOW DOUBLE DISC GATE VALVES

The parallel seat, double wedge type slide gate valve, developed and perfected by Ludlow, provides a number of essential benefits. For instance:

- *Smooth, Positive Operation.* Gates positioned *directly* opposite ports before wedging, and entirely unwedged *before* being raised.
- *Positive Closure*—even after years of service in the open position; flexible-action gates *self-adjusting* to seats.
- *Self-Cleaning.* Rings cleaned *throughout entire stroke. No internal guides* to cause foul-up.
- *Ready Replacement of Parts.* Simple construction with ample tolerances, permitting ready replacement of parts.



LUDLOW FIRE HYDRANTS

Distinctive List 90. Design now serving in thousands of cities and towns. *No Ludlow Fire Hydrant has ever failed in line of duty!* Employs famous Slide Gate Feature and offers the following advantages:

- *Quick Water* with least possible shock. Proper shut-off without water hammer.
- *Proper Drainage.* Hydrant automatically drained at *lowest* point when closed.
- *No Flooding.* Accidental breaking of the hydrant, such as might result by collision from a heavy truck, will not cause flood since the gate when closed is wedge-locked.
- *Easy Inspection and Servicing* without unscrewing anything below the ground level. All working parts removed as one unit by lifting stem through top of hydrant.

Outside Screw and Yoke Type

← Iron body, bronze mounted—tested at 350 lbs. hydrostatic pressure. List 44—sizes 2″ to 12″—200 lbs. working pressure. List 66—sizes 14″ to 48″—150 lbs. working pressure.

→ Iron body, bronze mounted—complying with latest A. W. W. A. Specifications. Tested at 300 lbs. hydrostatic pressure. Sizes 2″ to 48″.

A.W.W.A. Double Disc Gate Valve

← Iron body, bronze mounted—low pressure valves. List 3 Valves made in sizes 2″ to 48″ and can be furnished with Hub. Flanged. Universal, Spigot, and Screw Ends.

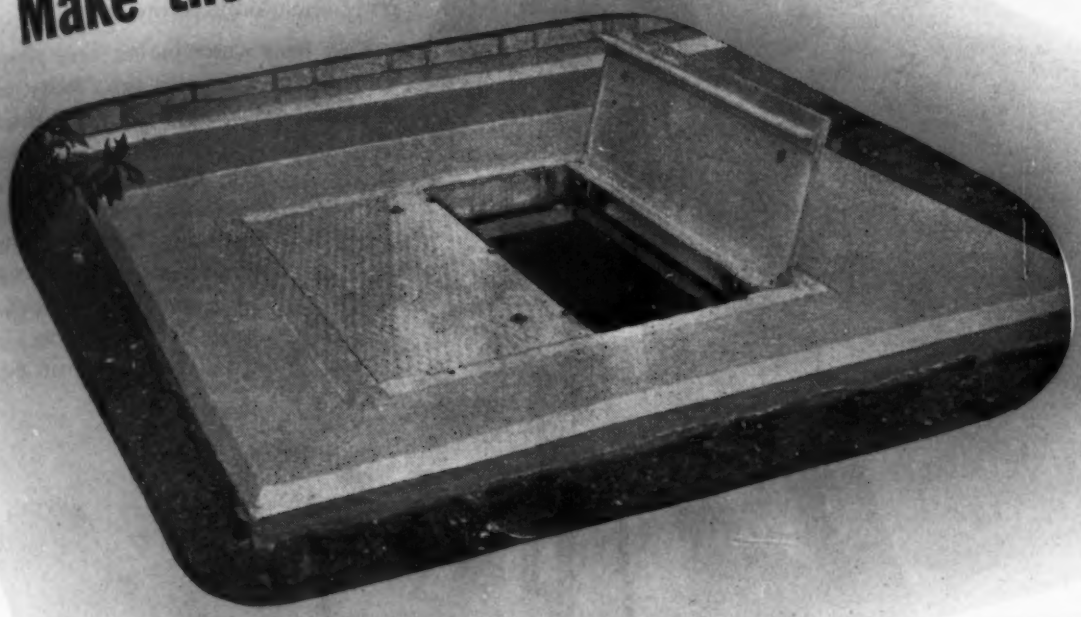
Valve shown with Hub Ends and without gearing. Also available with gearing or outside screw and yoke—and flanged ends.

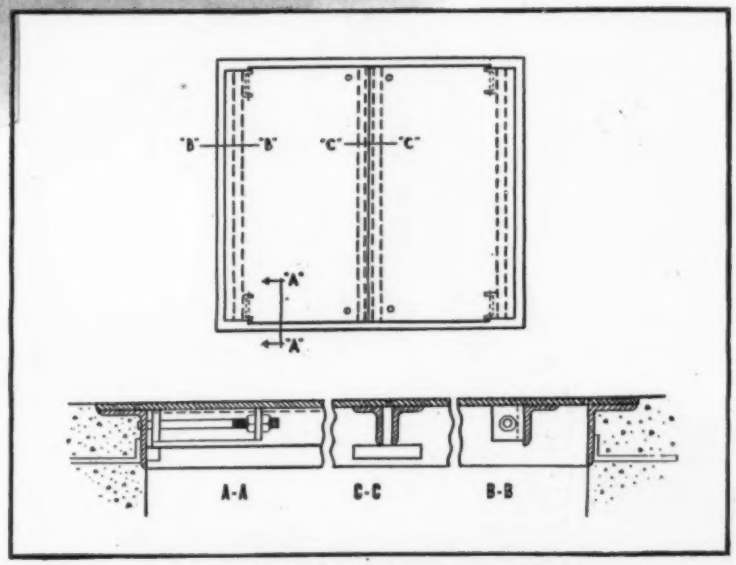
← Hydraulic Cylinder, iron body, bronze mounted—manufactured in all sizes for any desired test or working pressures. Can be operated by four-way cocks or remotely controlled by solenoid valves.

Flanged End Standard Gate Valve with Cast Iron Bronze Lined Hydraulic Cylinder

The LUDLOW VALVE MFG·CO·INC· SINCE 1866 TROY·N·Y·

Make those sidewalk doors of Alcoa Aluminum





Aluminum sidewalk doors are highly resistant to corrosion and so upkeep is negligible. Neat and trim when installed, they require no painting to keep them that way. Light in weight, they are easy to operate.

The design suggested here is simple and practical. Having concealed pivots, there are no obstructing projections above sidewalk level to cause tripping or other annoyances.

Have your metal fabricator quote on your requirements.

ALUMINUM COMPANY OF AMERICA, 1955 Gulf Building, Pittsburgh 19, Pennsylvania.

MATERIAL SPECIFICATION DATA

Tread Plate - - -	Alcoa 61ST Alloy
Structural Angles - -	Alcoa 53ST Alloy

Thickness of tread plate and size of angles to be suited to dimensions of opening and load requirements.

ALCOA FIRST IN ALUMINUM

Lay it with Confidence

Among products that have been proved by many years of experience, cast iron pipe is in the highest rank. Consider its truly remarkable record.

Cast iron water mains were pioneered in America 120 years ago. Today, in 200 out of 212 of our largest cities, some or all of the original cast iron mains are still in service, in many instances after more than a century. In the 15 largest cities, more than 95% of the pipe in the water distribution systems is cast iron pipe. In the three largest cities –

Based on Experience

New York, Chicago, Philadelphia—the ratios are respectively, 97%, 99% and 98%. Thus it is evident that top-flight engineers *continue* to endorse the judgment of four generations of water works men.

Confidence, based on experience, is doubly important in the case of pipe to be installed underground for distribution mains. They represent the major investment in a water supply system. So we say *—trust the pipe you know about.*

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3, Ill.

THE 10 REQUIREMENTS FOR UNDERGROUND MAINS UNDER NORMAL CONDITIONS

LONG LIFE: In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

CARRYING CAPACITY: The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

TIGHT JOINTS: For ordinary pressures, cast iron bell-and-spigot pipe—for high pressures, cast iron mechanical joint pipe—are known to be leak-proof.

TENSILE STRENGTH: When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

BEAM STRENGTH: Under beam stress tests, 10 ft. span, standard 6" cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

TOUGHNESS: Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6" cast iron pipe does not crack until the hammer is dropped four feet.

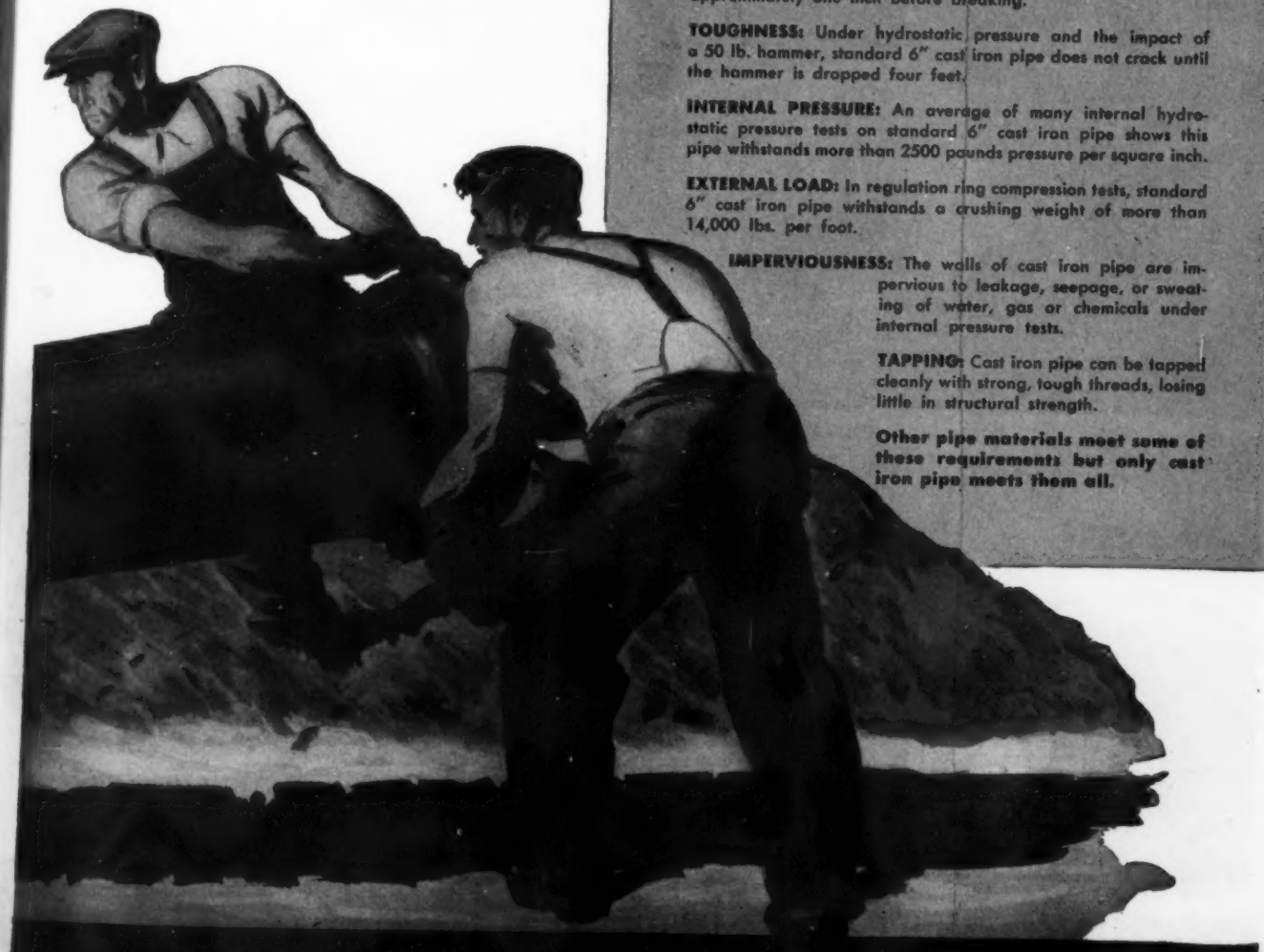
INTERNAL PRESSURE: An average of many internal hydrostatic pressure tests on standard 6" cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

EXTERNAL LOAD: In regulation ring compression tests, standard 6" cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

IMPERVIOUSNESS: The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

TAPPING: Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

Other pipe materials meet some of these requirements but only cast iron pipe meets them all.



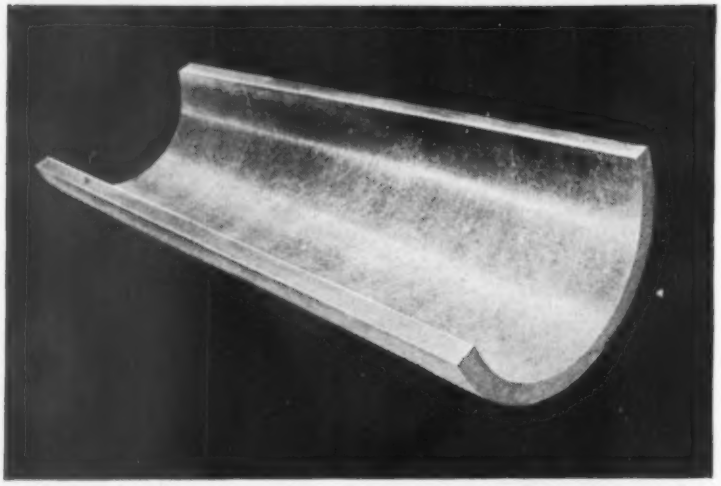
SERVES FOR CENTURIES

Tax Saver No. 1

You save on all 3 counts!

low installation costs

In every phase of pipe installation—including handling and assembly—you save with Transite! You save because this light weight pipe requires smaller installation crews . . . needs no mechanical handling equipment except for the larger sizes. Rapid assembly is assured with the Simplex Coupling.



low operating costs

Because of Transite's asbestos-cement composition, its initial high delivery capacity (C-140) can never be reduced by tuberculation. Pumping costs stay low. This advantage often permits use of smaller diameter pipe . . . and ends problems arising from progressive reduction of carrying capacity due to tuberculation.

low maintenance costs

In modern water systems, Transite Pipe provides another important money-saving advantage—low maintenance. Even in highly aggressive soils, it stubbornly resists corrosion. And because Transite cannot tuberculate, the need for periodic cleaning is eliminated—another appreciable maintenance saving.

Booklet TR-11A gives all the facts. Write Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Johns-Manville

TRANSITE PIPE
for efficient, economical water transportation

SPECIFY HOFFMAN CENTRIFUGAL BLOWERS

FOR MODERN AIR DIFFUSION SYSTEMS IN SEWAGE PLANTS

★ ECONOMICAL INSTALLATION

★ SIMPLE CONSTRUCTION ★ EASY MAINTENANCE

★ SIMPLE PIPING ★ CONTROLLED DISCHARGE

UPPER PHOTO: Hoffman blower installed in the sewage treatment plant at the Millington, Tenn., U. S. Navy Aviation Base. Three of these units are installed in the plant.

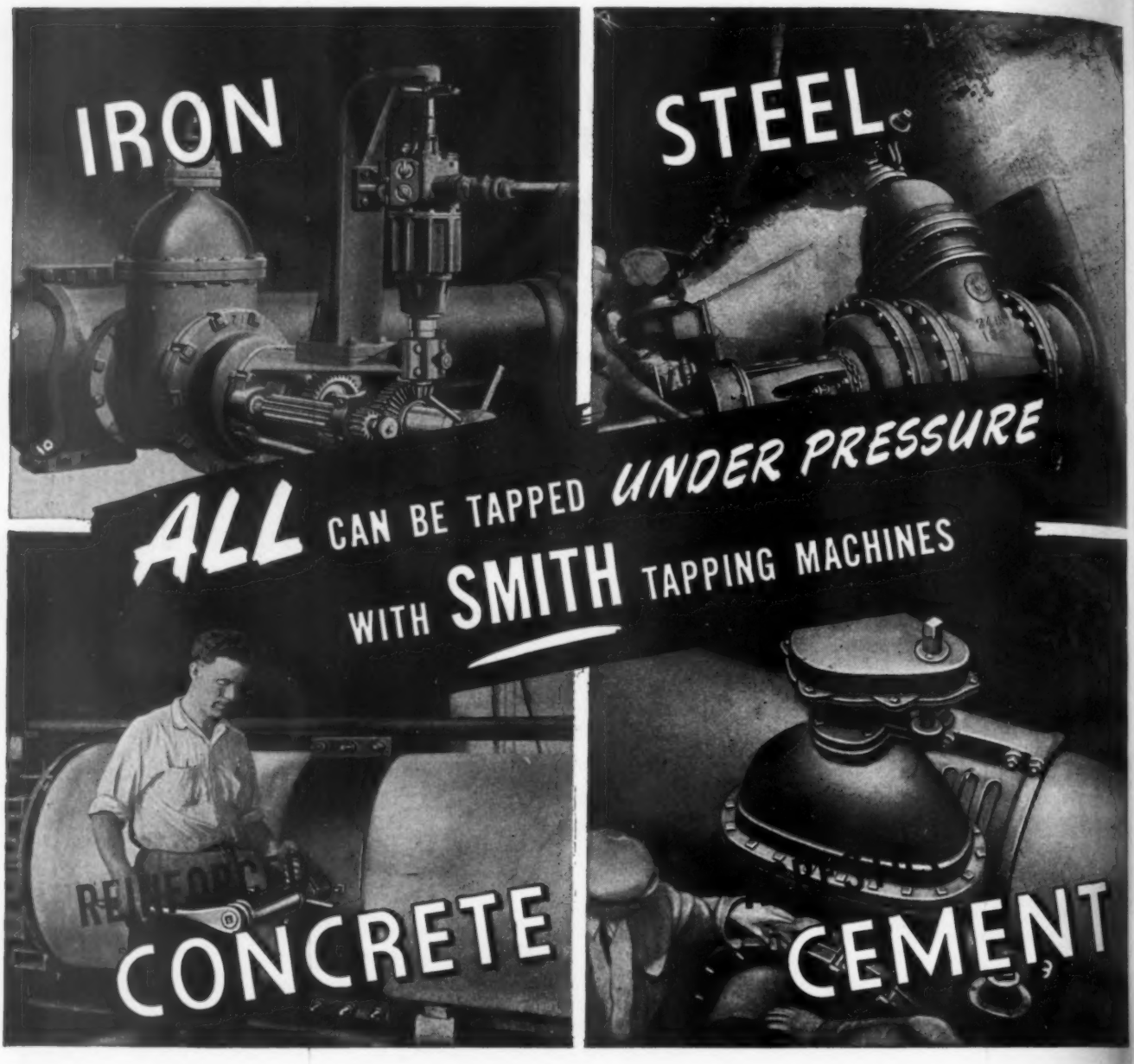
LOWER PHOTO: Chicago Wide Band Air Diffusion System with Swing Diffusers. Air is diffused through porous tubes for oxygen absorption by the sewage. Up to 98% purification is effected in sewage treatment plants serving populations of 3,000 and up.

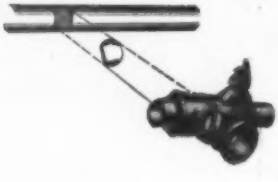
The United States Hoffman Machinery Corporation has specialized in the manufacture of high quality centrifugal air pumps for years. Hoffman quality is backed by an unchallenged reputation. Installations in sewage treatment plants in many parts of the country giving trouble-free service are proof of satisfactory performance. You can specify Hoffman blowers with the absolute assurance that you will get the highest quality and dollar-saving economy that years of experience have enabled us to put into them.

POUGHKEEPSIE PLANT NO. 1

U.S. HOFFMAN MACHINERY CORPORATION

AIR APPLIANCE DIVISION, 111 FOURTH AVE., NEW YORK





With A. P. Smith tapping equipment you can make branch connections up to 42" under full pressure on any type or size of pipe, without interrupting the flow, draining the line, or riling the water. These machines are for use with SMITH tapping sleeves, hat flanges, and tapping valves. The entire operation is quick, simple, satisfactory.

Write to the A. P. Smith Manufacturing Company for further information.

FIRE HYDRANTS
GATE VALVES
CHECK VALVES
INSERTING VALVES
TAPPING SLEEVES AND VALVES
WATER SERVICE BRASS GOODS

THE A. P. SMITH MFG. CO.

EAST ORANGE, NEW JERSEY

FLOOR STAND
INDICATOR POST
TAPPING MACHINE
INSERTING MACHINE
PIPE CUTTING MACHINE
CORPORATION TAPPING MACHINE

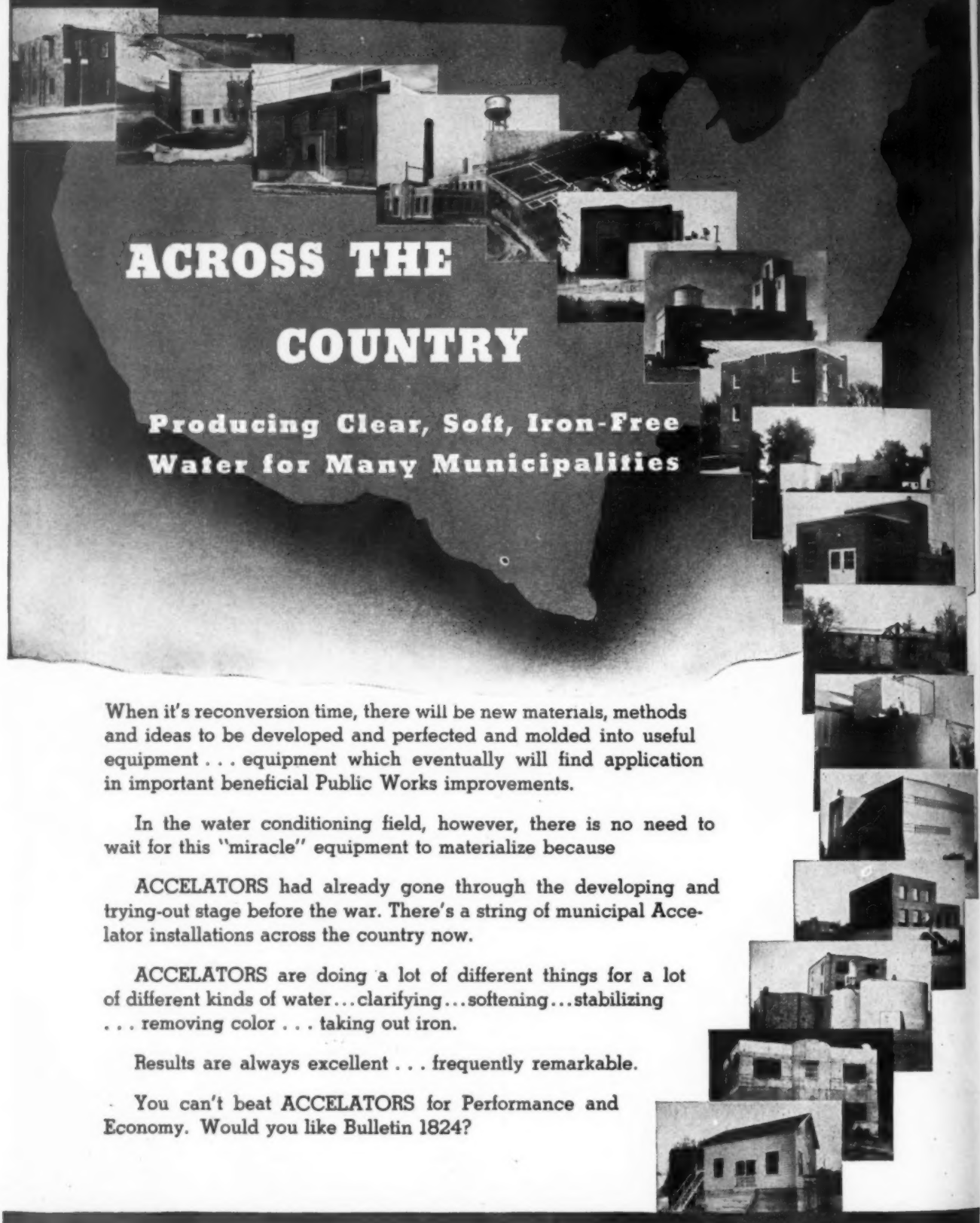
This brief statement regarding our facilities and products may be of interest to newcomers in the water and sewage works fields and may also serve as a reminder to the experienced. Our several foundries, representing the largest plant capacity in the industry, produce Super-de Lavaud centrifugally cast pipe in 12- and 18-foot lengths and diameters up to 24 inches—pit cast pipe in sizes up to 84 inches—with bell-and-spigot, mechanical and flexible joints or with plain ends—and fittings of any size or practicable design. Our headquarters and plant laboratories maintain rigid production controls. Our technical and sales engineering staffs, backed by 45 years of experience, are at your service.

U.S.
cast iron
PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

Drawing by Dean Cornwell

THERE'S A STRING OF THEM NOW



When it's reconversion time, there will be new materials, methods and ideas to be developed and perfected and molded into useful equipment . . . equipment which eventually will find application in important beneficial Public Works improvements.

In the water conditioning field, however, there is no need to wait for this "miracle" equipment to materialize because

ACCELATORS had already gone through the developing and trying-out stage before the war. There's a string of municipal Accelator installations across the country now.

ACCELATORS are doing a lot of different things for a lot of different kinds of water...clarifying...softening...stabilizing . . . removing color . . . taking out iron.

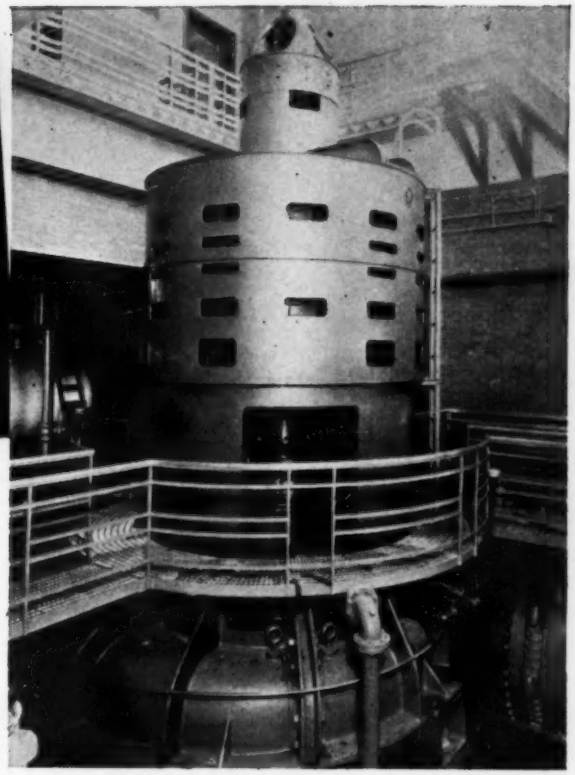
Results are always excellent . . . frequently remarkable.

You can't beat ACCELATORS for Performance and Economy. Would you like Bulletin 1824?

INFILCO

INFILCO
INCORPORATED
325 W. 25th PLACE, CHICAGO 16, ILL.

OVER 80% EFFICIENCY PUMPING 870,000,000 GALLONS PER DAY



Buffalo had a big assignment—a $15,000,000 sewage-treatment plant on Bird Island. Some of the largest-capacity sewage pumps ever built would be required: six main pumps, each with a capacity of well over 100,000,000 GPM. Also, seven additional feeder station units would be required . . . 4 units at South Buffalo Station, 3 units at Hamburg Station.

The Buffalo Sewer Authority, working with Greeley & Hanson as designing and consulting engineers, and McCarthy Bros. & Fond, Contractors, selected Worthington Centrifugal Pumps.

Here are some facts about these Worthington Pumps that are now operating at an overall efficiency (pump and motor) of 81.93% at 23 ft. head. Each main pump has a capacity of 120,000,000 GPD under 23-ft. head and 145,000,000 GPD against 18-ft. head. Four pumps are driven by 550 HP, vertical synchronous motors at 180 RPM, two by double vertical synchronous motors at either 180 or 156.6 RPM. The Combination provides maximum operating flexibility of capacity range from 55,000,000 to 335,000,000 GPD without sacrificing efficiency for any combination of capacity and head.

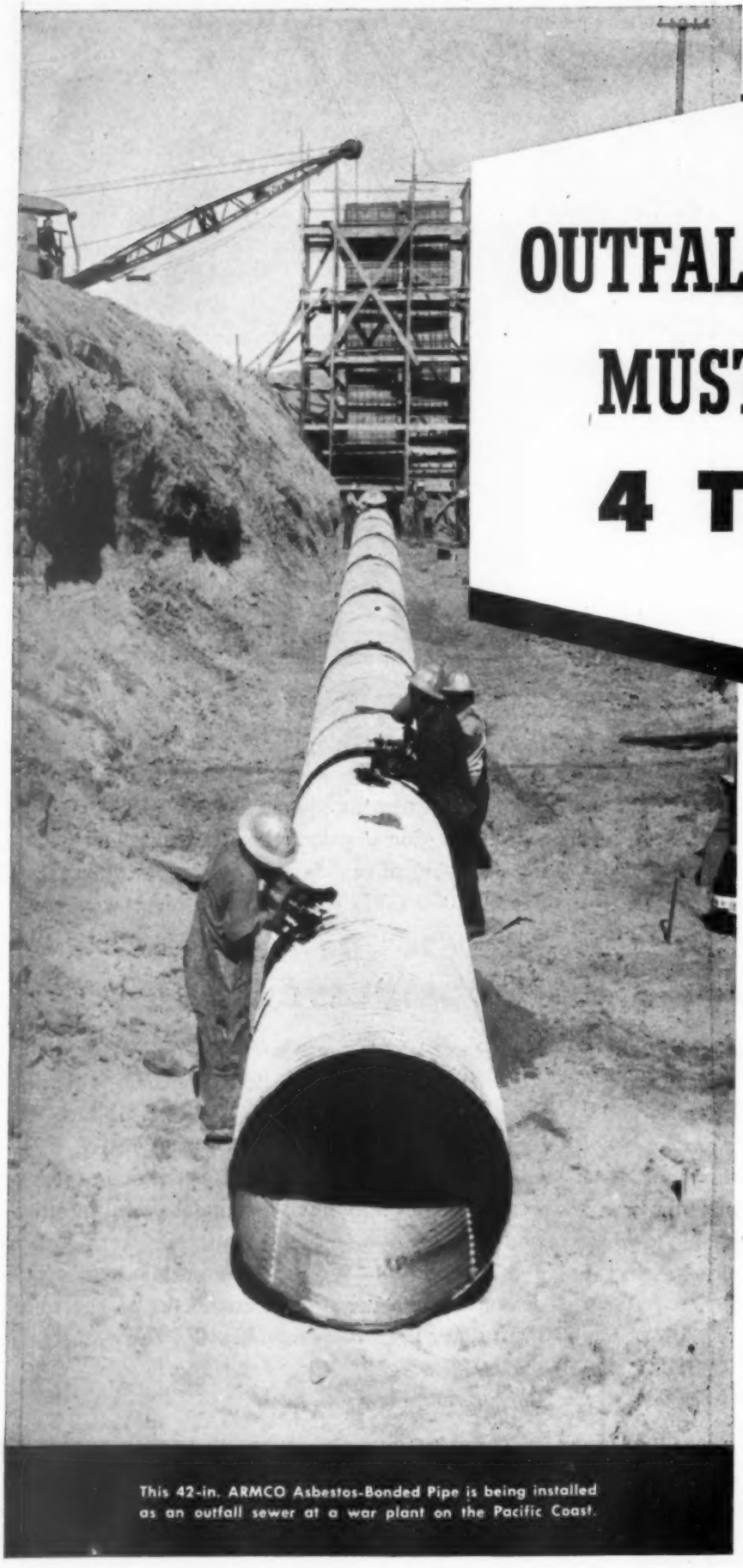
WORTHINGTON . . . THE COMPLETE LINE

Diesel engines, gas engines, steam turbines, compressors and vacuum pumps, portable compressors and air tools, turbine well pumps, water softening and filtering systems and water meters are among the many other products carrying the Worthington trademark into sewage plants across the country. Backing these products is an engineering staff available to you —wherever you are, anywhere in the world—in selecting equipment of proper specifications.

More complete information on the Bird Island installation can be read in Bulletin RP-155. At the same time ask for Bulletin W-313-B2 which describes Worthington Axial-Flow and Mixed-Flow Centrifugal Pumps for low and moderate head services. The latter bulletin also contains useful information on selection, arrangements, engineering data and a report on Worthington installations which demonstrates a nation-wide confidence in the statement that *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, N. J.*

MORE JOBS GO TO WORTHINGTON
The complete line . . . the top engineering
CENTRIFUGAL PUMPS • DIESEL & GAS & SEWAGE GAS ENGINES, DUAL FUEL ENGINES • TURBINES & TURBO-GENERATORS • GAS ENGINE-COMPRESSORS STATIONARY COMPRESSORS • WATER SOFTENING, FILTERING EQUIPMENT • VERTICAL TURBINE PUMPS WATER METERS • POWER TRANSMISSION EQUIPMENT • PORTABLE COMPRESSORS & AIR TOOLS

WORTHINGTON



This 42-in. ARMCO Asbestos-Bonded Pipe is being installed as an outfall sewer at a war plant on the Pacific Coast.

OUTFALL SEWERS MUST MEET 4 TESTS

That outfall sewer your plant or your community will need after the war should be designed against (1) disjointing and infiltration, (2) continual maintenance and early replacement, (3) severe service conditions, and (4) obsolescence.

You get these assurances when you specify ARMCO Asbestos-Bonded Paved Invert Pipe. (1) Long, lightweight sections are securely coupled together. (2) Flexibility protects against vibration and impact. (3) An asbestos-bonded coating over galvanizing, and a thick pavement in the bottom, assure long life under even the severest conditions. (4) This pipe is removable—has salvage value.

Write for the ARMCO Sewer Book. Address Armco Drainage Products Association, 405 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO ASBESTOS-BONDED SEWER PIPE

Years of Fine Performance

UNDER ABOUT EVERY CONDITION ENCOUNTERED IN LAYING BELL & SPIGOT WATER LINES

Have Won Preference for this DIFFERENT Jointing Compound

★ Claims alone cannot maintain a product reputation. That of *Tegul*-MINERALEAD has been won by outstandingly fine performance under all sorts of conditions.

★ Tough terrain, bridges subject to constant heavy traffic disturbance, locations where heavy machinery in nearby plants delivered heavy vibration 24 hours a day . . . all these are part of *Tegul*-MINERALEAD's daily dozen.

★ Lines jointed with *Tegul*-MINERALEAD are put through in high summer and low winter temperatures with minimum of trouble and in record elapsed time.

★ Because *Tegul-MINERALEAD* is delivered in the form of solid ingots, there can be no difficulties due to change in physical condition. You can't "shake down" the composition of an ingot. Nor is *Tegul*-MINERALEAD impaired by exposure to moisture, as when stored in the open.

★ The experience of users for well over a decade commends Tegul-MINERALEAD as the jointing compound for your bell & spigot water lines.

We will be glad to send literature giving more detailed information. Please address our Mertztown Office.

You can reach an ATLAS representative at any of the addresses listed. Stocks of *Tegul*-MINERALEAD are maintained at points indicated.

THE *Atlas Mineral*

PRODUCTS COMPANY OF PENNA
MERTZTOWN PENNSYLVANIA

*ATLANTA 3, Ga., 161 Spring St., N.W
*CHICAGO 1, Ill., 333 No. Michigan Ave.
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*JACKSONVILLE 5, Fla., 1463 Talbot Ave.
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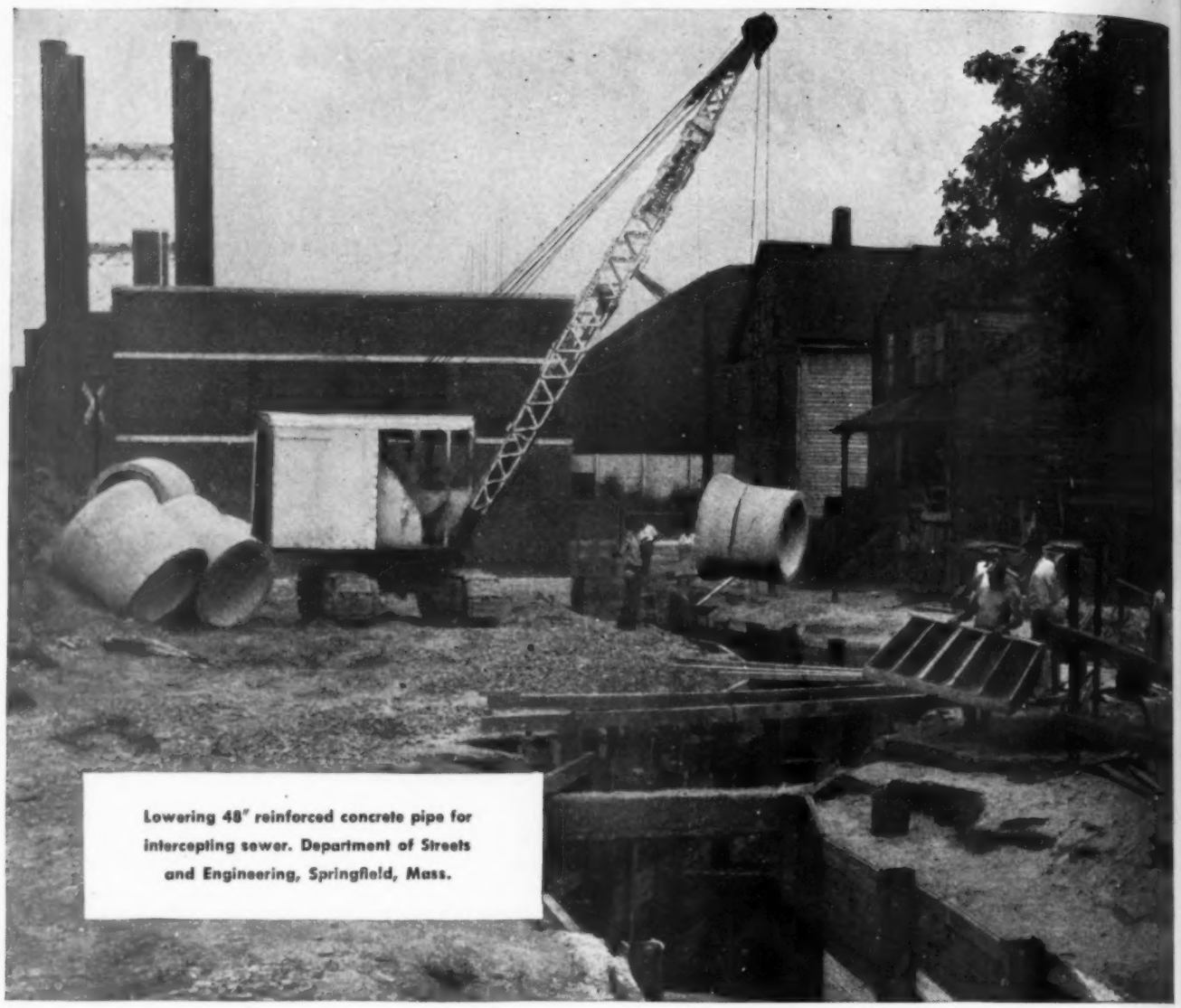
P. O. Box 3084
1212 So. State St.
at these points



Lowering 48" reinforced concrete pipe for intercepting sewer. Department of Streets and Engineering, Springfield, Mass.

CONCRETE PIPE LINES

AMPLE STRENGTH for most severe load and impact conditions.

HIGH WEAR RESISTANCE to abrasion caused by suspended grit.

MAXIMUM CARRYING CAPACITY assured by clean joints and smooth texture of inside surface.

MINIMUM INFILTRATION and LEAKAGE assured by tight joints and uniformly dense concrete.

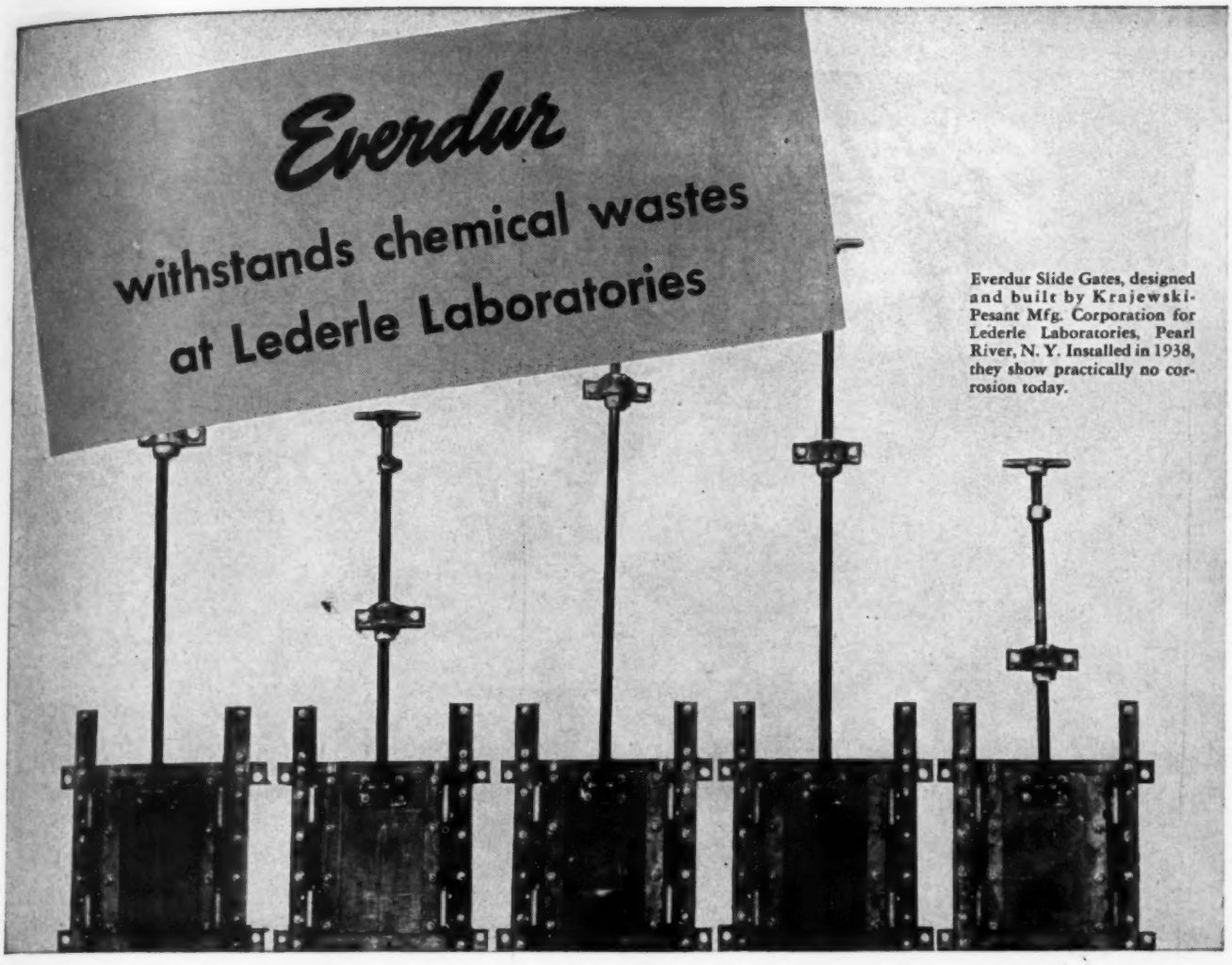
Technical information in connection with any phase of concrete pipe construction gladly furnished free by this Association or any of its members. (List on request).

AMERICAN CONCRETE PIPE ASSOCIATION

228 N. La Salle Street, Chicago 1, Illinois • 342 Munsey Building, Washington 4, D. C.

BUY VICTORY BONDS

Everdur withstands chemical wastes at Lederle Laboratories



Everdur Slide Gates, designed and built by Krajewski-Pesant Mfg. Corporation for Lederle Laboratories, Pearl River, N. Y. Installed in 1938, they show practically no corrosion today.

OUTSTANDING as a producer of vaccines, serums, and other biologicals are the Lederle Laboratories of Pearl River, New York. War demand for blood plasma and later for penicillin resulted in tremendous enlargement of both plant and personnel.

Constant cleanliness and uninterrupted sanitation facilities are essential in maintaining the sterility of such products. Here, sewage equipment installed before the war must function efficiently, regardless of the increased volume, varying chemical nature, and fermentation of the wastes handled.

Everdur*—the copper silicon alloy—in the slide gates, screens, weir plates and other mechanical equipment of the sewage system, has again completely solved the problem of corrosion resistance under difficult conditions. From the Lederle Laboratories comes the statement that the Everdur parts serve "—in sewage which probably contains a greater variety of chemicals than is usually encountered in Sewage Treatment Plants, and they show *practically no corrosion yet.* We consider them very excellent for the purpose."

Rust-proof and corrosion resistant, Everdur has the strength of mild steel, and thus makes lightweight construction practicable. Made in nearly all commercial forms. Everdur is readily fabricated and welded. And with all these advantages, it is moderate in cost. 45191

OTHER APPLICATIONS FOR EVERDUR

Coarse and Fine Screens, Float Chambers, Swing Gates, Coarse Bar Rack Aprons, Effluent Weirs and Scum Weirs, Structural Scum Baffle Brackets, Troughs, Screen Hoppers, Orifices, Baskets, Anchors, Ladders, Float Gage Chains, Manhole Steps, Guides, Walkways, Bars, Plates, Bolts, Nuts.

*Reg. U. S. Pat. Off.

ANACONDA

BUY WAR BONDS . . . Buy all you can . . . Keep all you buy.

Everdur Metal

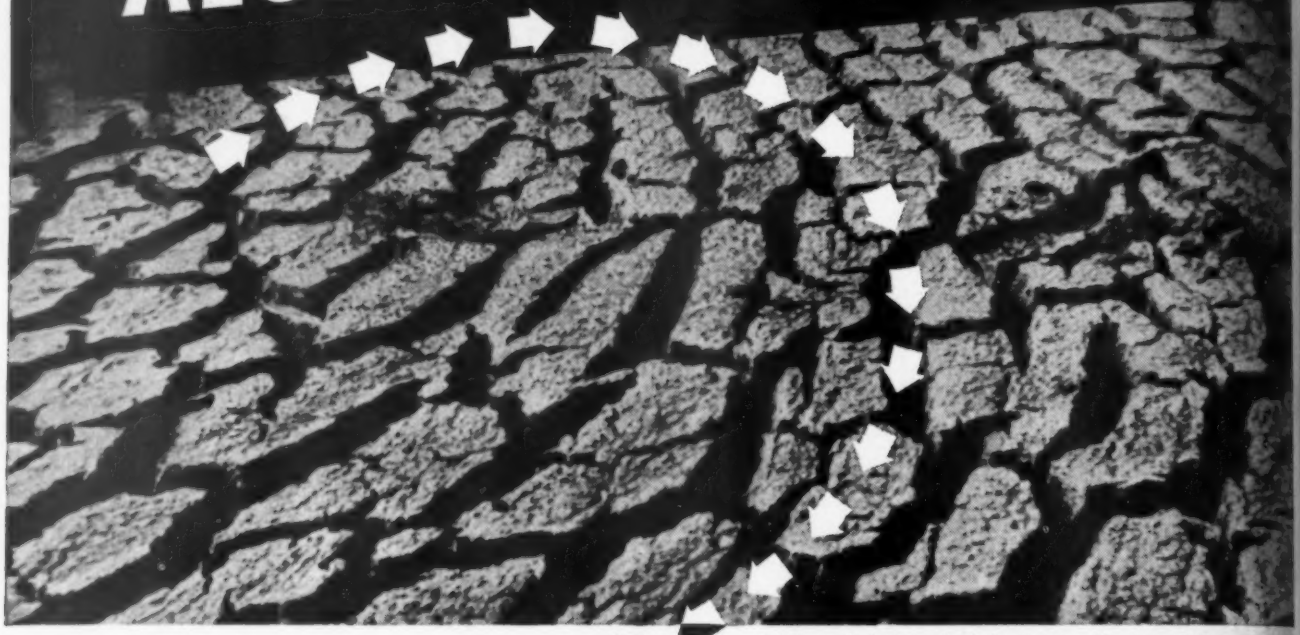
THE AMERICAN BRASS COMPANY

Subsidiary of Anaconda Copper Mining Company

General Offices: Waterbury 88, Connecticut

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

GENERAL CHEMICAL ALUMINUM SULFATE



Well cracked sludge bed shortly after Aluminum Sulfate treatment.

SPEEDS SLUDGE DRYING

General Chemical Alum speeds sludge dewatering and drying on sand beds... capacity of beds may be doubled, even tripled . . . quick removal lessens chance of odor and fly nuisance . . . reduced volume of cake decreases cost of removal. Sewage works operators the nation over count on the benefits obtained from Alum treatment throughout the year.

Why not learn what General Chemical Alum will do in your plant too? Full information may be obtained quickly from the nearest General Chemical Sales and Technical Service Office listed below.

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee & Yakima (Wash.)

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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

ADVANTAGES OF PRESTRESSED CONCRETE CYLINDER PIPE • NO. 1

Higher Pressure Ranges

• PRESTRESSING, already well recognized as the normal trend of development in the design of reinforced concrete structures, is a "natural" for pressure pipes because of their tubular shape.

Lock Joint Pipe Company has applied the principles of prestressing steel in tension and concrete in compression in the design and manufacture of Lock Joint Prestressed Concrete Cylinder Pipe.

Retaining all the inherent advantages of the fundamental principles of Lock Joint pipe design, the use of high tensile steel makes possible still higher pressures in a greater range of sizes in keeping with Lock Joint economy of first cost and maintenance.

When you specify Prestressed Concrete Cylinder Pipe, you can depend upon a pipe of maximum elastic qualities as well as a pipe with the inherent benefits of water-tightness, durability and permanent high carrying capacity of steel cylinder design.

A Hazen-Williams Hydraulic Slide Rule will gladly be sent upon request with our compliments.

LOCK JOINT *Reinforced Concrete* PRESSURE PIPE

LOCK JOINT PIPE COMPANY

Established 1905

P. O. BOX 269, EAST ORANGE, NEW JERSEY

Denver, Colo. · Chicago, Ill. · Kenilworth, N. J. · Kansas City, Mo. · Rock Island, Ill.
Joplin, Mo. · Valley Park, Mo. · Cleveland, Ohio · Hartford, Conn. · Navarre, Ohio

SCOPE OF SERVICES — *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains of large diameter as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

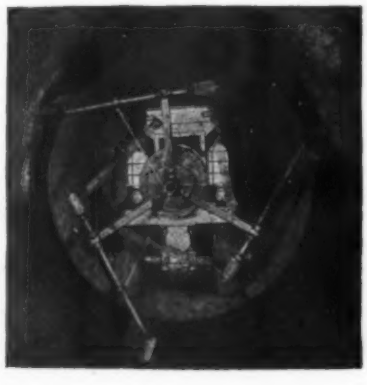
100 YEARS AGO

CEMENT-LINED PIPES FIRST USED

Although Europe introduced the initial use of cement lining for pipes, America was not far behind . . . because in the year 1845 a cement-lined pipe was laid in Jersey City, New Jersey.

Over a century ago the French Academy of Science went on record with the following statement: "Hydraulic cement is, of all the compositions combining facility of application with cheapness, that which adheres best to castings, is most indestructible, and prevents most effectually all oxidation (corrosion) and consequent formation of tubercles." Since then these findings have been proven over and over again—especially by the Centriline method of placing cement linings in water supply lines of large and small diameter.

The Centriline process consists of first cleaning the main and then applying by centrifugal force, a dense cement mortar lining of required thickness, mechanically troweled to a smooth finish "in situ". During long years of experience Centriline has lined and reconditioned pipe-lines of every age, varying in diameters from 30" to 90", and have increased the sustained carrying capacity for tuberculating waters from 20% to 100%. Wherever your pipe is situated, whatever its age, whatever its length—if its diameter is 30" or more—Centriline men and equipment can quickly reach and recondition it with a sleek, new cement lining.



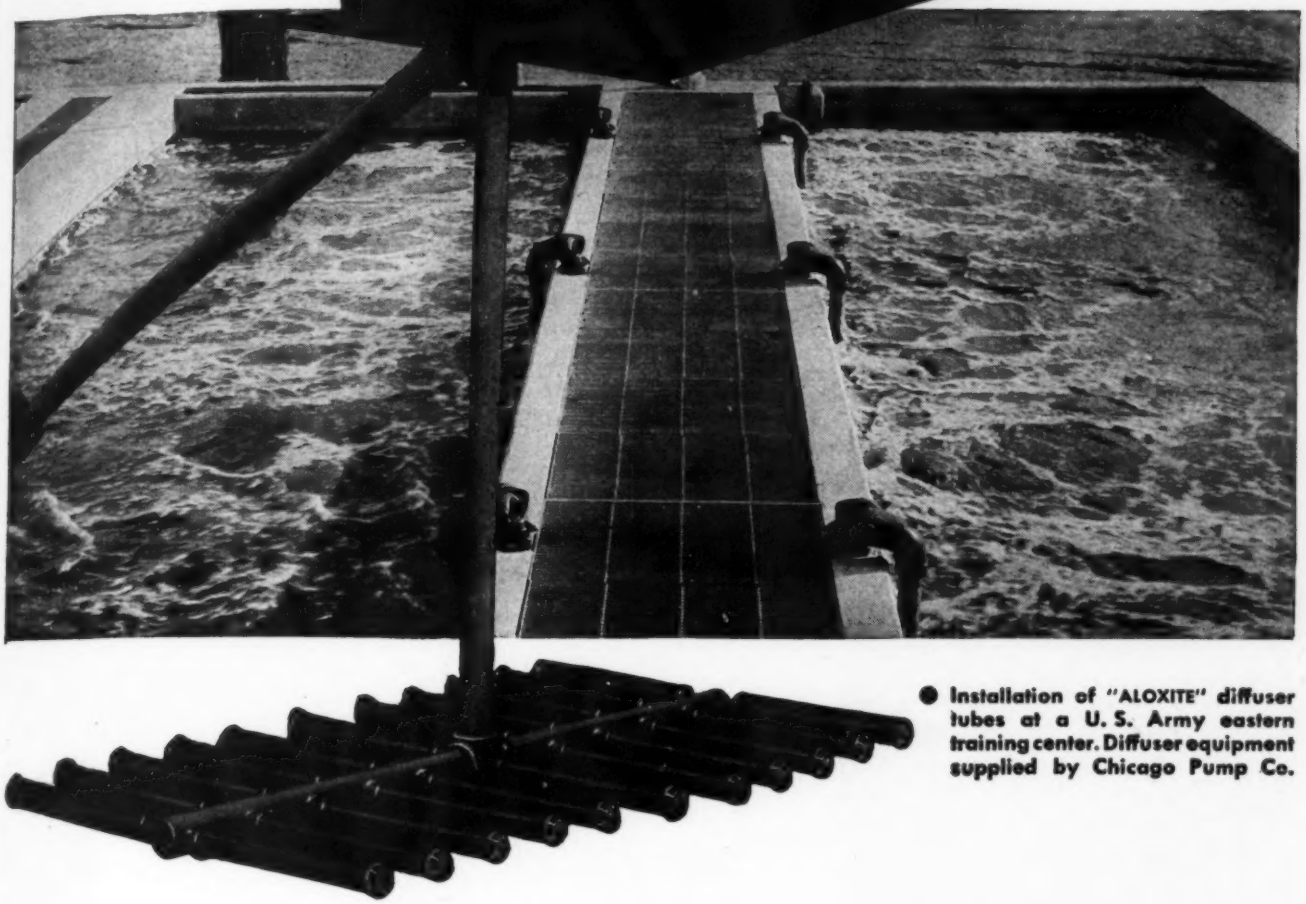
CENTRILINE PROCESS

RESTORES AND PROTECTS PIPE-LINE CARRYING CAPACITY

CENTRILINE CORPORATION
148 CEDAR STREET • NEW YORK 6, N. Y.

"ALOXITE" Diffuser Tubes for Aeration

win new friends and influence economy!



● **Installation of "ALOXITE" diffuser tubes at a U. S. Army eastern training center. Diffuser equipment supplied by Chicago Pump Co.**

Over 100 installations of "ALOXITE" aluminum oxide diffuser tubes have proved their effectiveness and economy. Here are the benefits provided:—

- **Simple Assembly**
- **Low Cost**
- **Flexibility of Application**
- **Ease of Servicing**

Early tank designs utilized "ALOXITE" tubes suspended parallel to the tank axis. Subsequent designs use "ALOXITE" tubes at right angles to the tank axis. These later designs, based on stationary assembly or on removable "swing" tube assembly of the type illustrated, are providing the following additional money-saving features:

- **A wide band of air diffusion resulting in more efficient oxygenation.**
- **Orifice control of air resulting in diffusion at low installed cost.**

Specify "ALOXITE" diffuser tubes for your aeration tanks. And for more information on these, write for Engineering Bulletin No. 1.

THE CARBORUNDUM COMPANY
Refractories Division
Dept. W-5
Perth Amboy, N. J.

"CARBORUNDUM" and "ALOXITE" are registered trade marks of, and indicate manufacture by, The Carborundum Company

Porous Products by **CARBORUNDUM**
TRADE MARK

...and endures through the years in service!

STARTING from the time you load its 13-foot lengths onto your trucks . . . continuing during its rapid assembly in the trench . . . and lasting throughout its long, dependable service underground, Transite Sewer Pipe makes important contributions to more efficient, economical sewage disposal.

Check these money-saving advantages:

FAST INSTALLATION. Transite's light weight means easier handling; its long 13-foot lengths reduce the number of joints in the line, speed up assembly.

LESS INFILTRATION. Its floating sleeve-type joint combines flexibility with tightness . . . guarding against costly infiltration and cutting down on the load at the disposal plant.

HIGH DELIVERY CAPACITY. The smooth interior surface of this asbestos-cement pipe assures high delivery capacity . . . frequently permits smaller pipe, or flatter grades with correspondingly shallower trenches.

CORROSION-RESISTANT—outside, inside and all the way through! Transite's high corrosion resistance has been proved in countless installations, under a wide range of soil conditions.

If you are planning sewage works projects for the days ahead, you will want all the facts about Transite Sewer Pipe. Brochure TR-21A is free on request. Address Johns-Manville, 22 East 40th St., New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE *SEWER* PIPE

FOR EFFICIENT, ECONOMICAL SEWAGE DISPOSAL

FOUNTAIN OF YOUTH *Rediscovered*

PONCE de Leon, in 1513, sought the Fountain of Youth —in vain. He *did* find a cool, crystal-clear spring of pure, sparkling water. The spring still flows at St. Augustine, Florida. While its water possesses no magical, rejuvenating properties, it does, in common with all pure water, have the power to perpetuate good health—and thus increase the life span of those who drink it.

Water borne disease and pestilence once took terrific toll. Now, with modern purification facilities and alert health control, these hazards are virtually a thing of the past. So actually the Fountain of Youth today is symbolized by *pure drinking water.*

The vast postwar program for improved water production and distribution and modernized sewage disposal should bring added security to health.

Pure water is an obligation to every community. Water utilities must be operated on a self-sustaining basis as an extra incentive to maintain highest standards of excellence. It is a significant fact that the finest water systems are metered to consumers—insuring fair and equitable return on the investment.

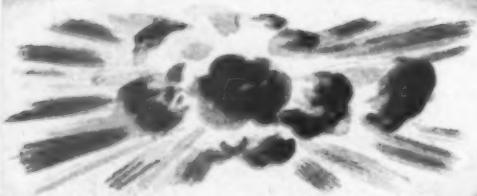
PITTSBURGH-EMPIRE METERS

—charged with the responsibility of accurately measuring pure water

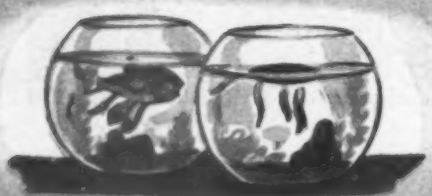
Interesting Facts About WATER

WATER DOESN'T ALWAYS FREEZE AT 32° F.—It usually freezes at that temperature but Arctic explorers have found streams of fresh water flowing at zero temperature under 16 feet of ice. Scientists have found that if you keep straining ice out of freezing water, you will finally have some water left that is very difficult to freeze at all.

WATER CAN CAUSE COMBUSTION—Yes, in country districts it probably sets as many fires as it puts out. Bacterial and chemical action influenced by water causes the ignition of hay, feed, fertilizers, etc., when held in storage.



WATER EXPLODES—Right—the well-known water hammer is a form of explosion caused by the transmission of reacting pressure waves against a closed container.



THERE ARE TWO KINDS OF WATER—Ordinary water and "heavy water." The first is made up of ordinary hydrogen and oxygen atoms—the second has atoms in either group that are heavier than normal. You can't tell heavy water from ordinary water by taste or appearance, but fish placed in it will quickly die.

WATER CONSUMPTION—Water consumption in a typical home is around 50 gallons per day, per person. That's a dramatic reminder of the importance of good water and the necessity for accurate metering.

NEW FRONTIERS FOR SERVICE

The Pittsburgh-Empire organization pioneered many of the important developments in water meter history. These accomplishments have been recognized and appreciated by the water works trade. They have been reflected in a steadily increasing volume of business. But success cannot be measured solely in terms of increased sales. Real success comes to those who refuse to believe themselves to be successful.

Planning at Pittsburgh-Empire is a continuous process. Research and development engineers are always thinking ahead of the times. Pittsburgh-Empire, alone among meter manufacturers, sponsors fellowships at the Mellon Institute of Industrial Research and the Armour Research Foundation. Here skilled technicians follow significant developments that will either enhance performance or add to the value customers receive from completed products.

In the ever-expanding march of the water works industry, Pittsburgh-Empire will continue to make major contributions to the science of measurement. Their part in the future will be magnified by an ever-growing concept of engineering and research accomplishments.

PITTSBURGH EQUITABLE METER COMPANY

Atlanta — **Merco Nordstrom Valve Company** — Tulsa
Chicago — **Main Offices, Pittsburgh 8, Pa.** — Seattle
Kansas City Houston Boston San Francisco Los Angeles New York

National Meter Division, Brooklyn, N. Y.

PITTSBURGH-EMPIRE

Water Meters

Enough Said!

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CHICAGO 4, ILL.

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Much though we enjoy the visits of your service engineer, at present your damned old equipment is working so well we don't feel we can justify the expense.

This service to be performed in accordance with the notice sent us.

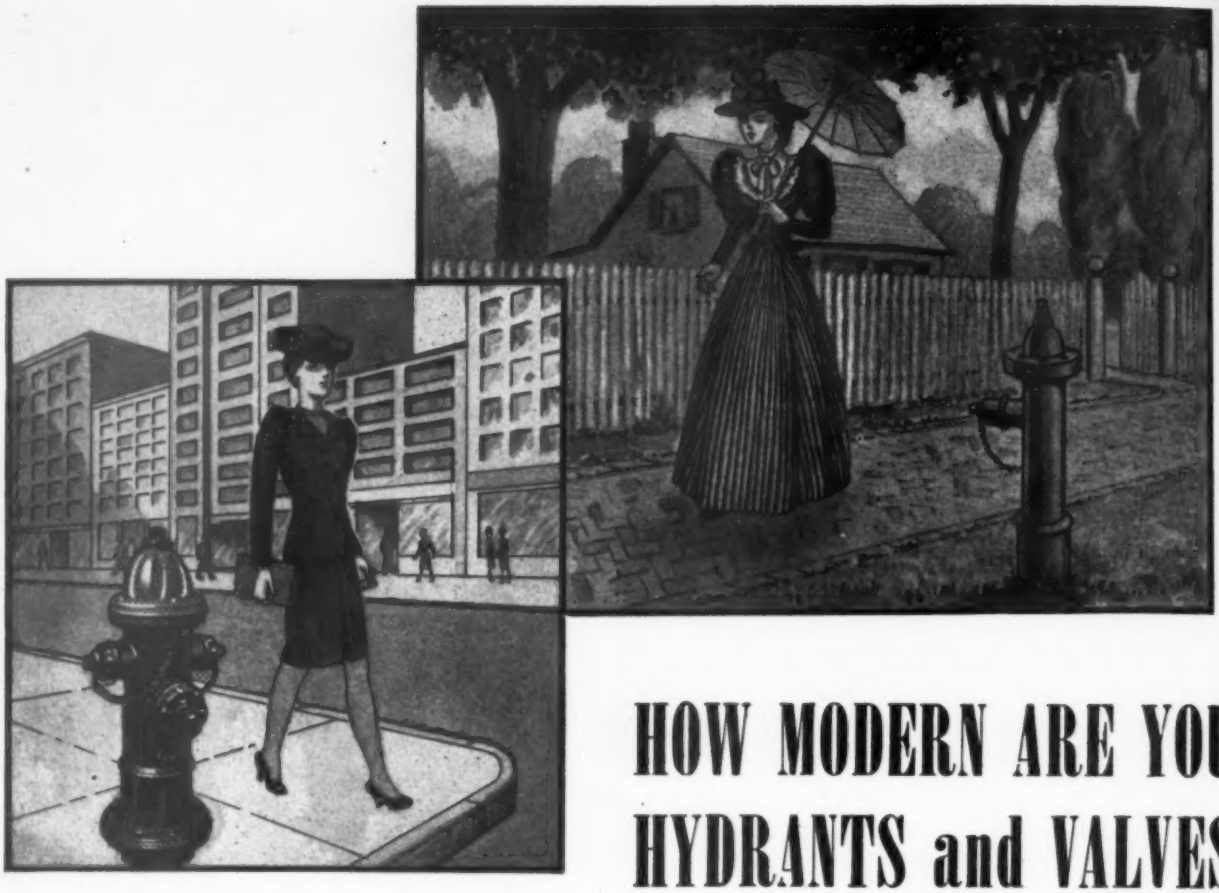
DATE [redacted]

SIGNED [redacted]

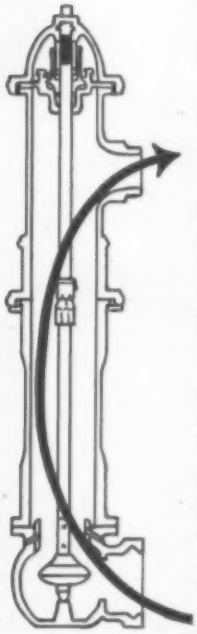
ADDRESS [redacted]

*Name furnished on request.

SIMPLEX VALVE & METER CO.
6743 UPLAND STREET, PHILADELPHIA 42, PA.



HOW MODERN ARE YOUR HYDRANTS and VALVES?



Water Flows Unimpeded in a Fast Curve

Have you in your city fire hydrants and valves that were installed in the gay nineties? Are they so outmoded in size or design as to be unequal to current demands?

Many older model hydrants are hopelessly inefficient when measured by today's standards. Take a look at the modern MUELLER-COLUMBIAN Improved Fire Hydrant. The oversize barrel is uncluttered with mechanisms to block the flow of water. The shoe at the base is extra large to permit wide opening of the compression type valve. Water goes through in a sweeping curve without water hammer and out the nozzles where another curve speeds the flow. The exclusive self-oiling top adds years to the life of the operating mechanism and makes opening easy. The safety-flange and coupling reduce traffic damages to a very small item in the year's costs. Large, bronze-bushed, dual drain valves prevent rusting of parts or freezing. These are but a few of the many good points. If you cannot boast that you have ALL these features in your hydrants, then you do not have the best. It will pay you to modernize with MUELLER-COLUMBIANS.

Are your gate valves old-timers, too? Then modernize with MUELLER-COLUMBIANS. Note this brief summary of money saving features. Exclusive 4-point wedging mechanism in the gate assembly. High tensile strength stems. All vital parts of enduring bronze. Bodies are extra thick, close-grained, gray iron. Here is a valve that will give you unparalleled performance year in and year out with a minimum of maintenance.

The best evidence that MUELLER-COLUMBIAN products stand up under the rigors of hard service is the fact that we get many repeat orders. A further proof is found in the ever increasing number of engineers who specify MUELLER-COLUMBIAN when drawing up the plans. Bring your water service up-to-date. Modernize with MUELLER-COLUMBIANS. It will be worth it. Write us today for complete details of these up-to-the-minute products.

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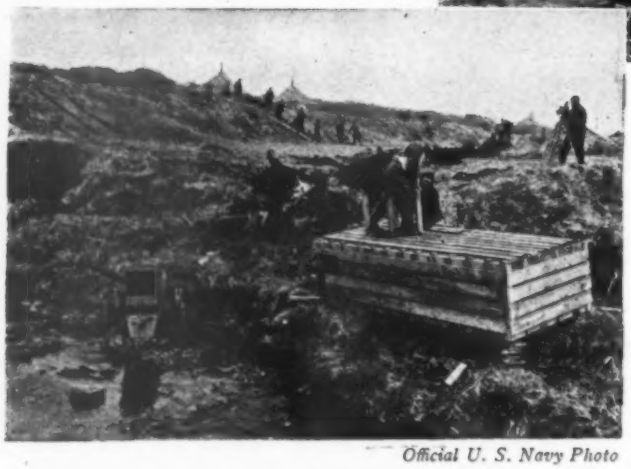
FROM THE MUDHOLES OF THE SOLOMONS

TO THE BLEAK ALEUTIANS—

Signal Corps Photo



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High Test Hypochlorite

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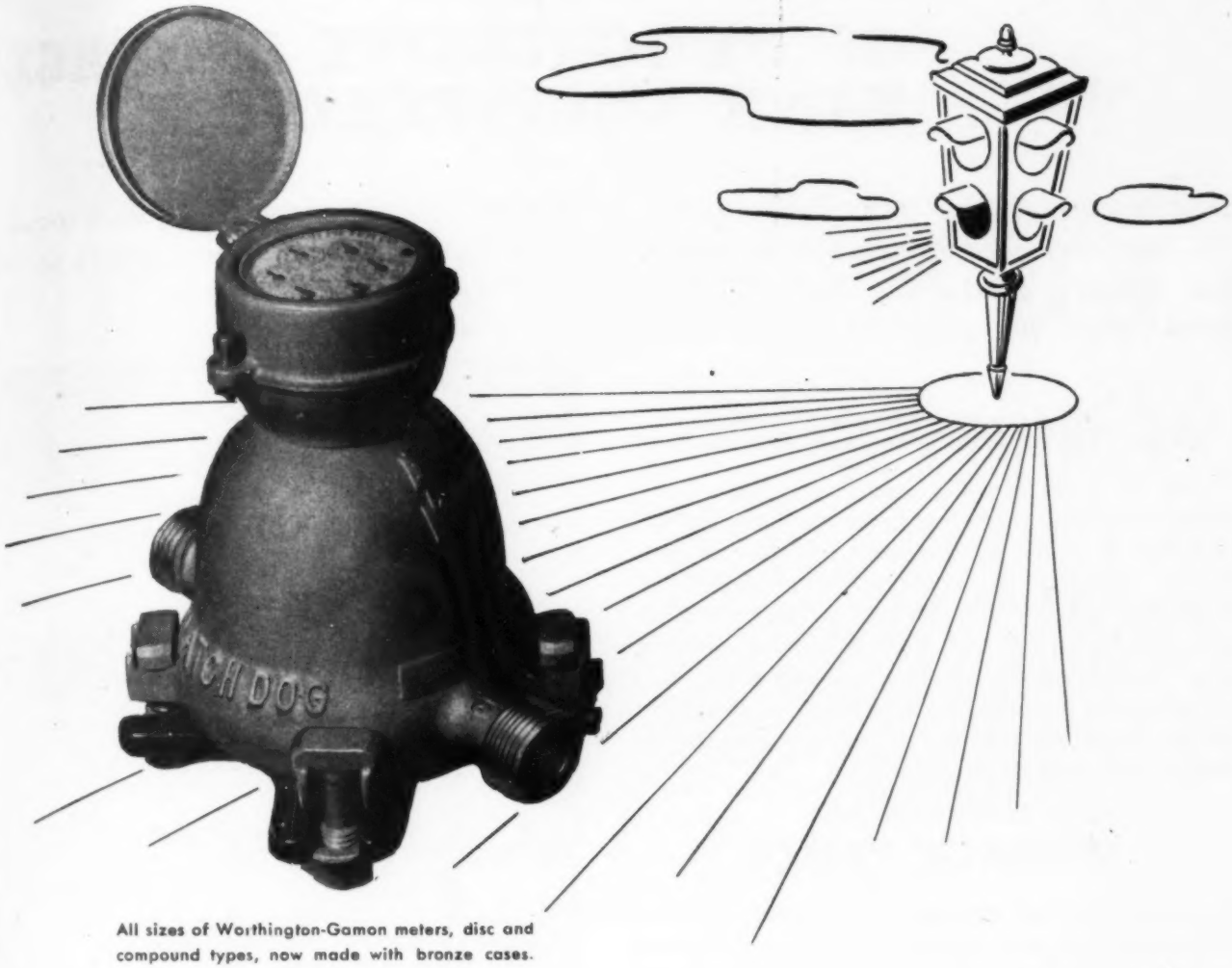

All sizes of Worthington-Gamon meters, disc and compound types, now made with bronze cases.

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EXPERIENCE . . . RESEARCH . . . SERVICE

Since Worthington-Gamon is the oldest water meter manufacturer in the business . . . with the largest research and production facilities in the field of hydraulics . . . with 24 district offices in 24 leading cities—you'd naturally expect from Worthington-Gamon the fastest service on meters that provide top accuracy and least maintenance over the longest life.

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Established in 1854, the R. D. Cole Mfg. Co. has long been recognized as one of the nation's outstanding tank builders. With over 90 years of "progressive storage tank experience" at your disposal, we will welcome the opportunity to serve your tank needs.

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Pressure tanks for storage of gas from digesters at sewage disposal plants so that excess output at peak loads can be used during off-peak periods. Chemical storage tanks, hot water storage tanks, tanks for bulk storage of oils and gas.

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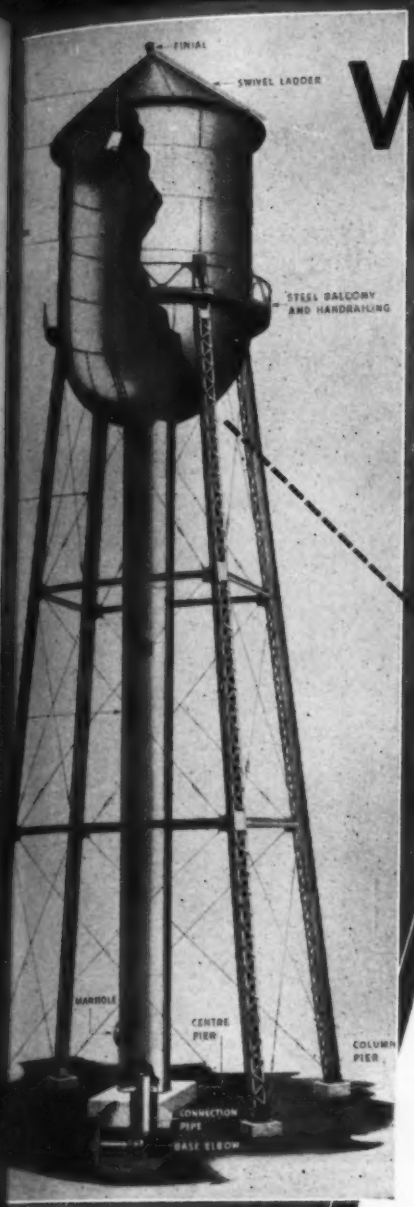

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ELEVATED STEEL TANKS

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Basic in design and economy, the Cone Roof, Hemispherical Bottom P·DM Elevated Steel Tank is a standard product, meeting the requirements of smaller communities for better water storage. Its range of capacities and accessories permits flexible application to individual need. • Hemi-ellipsoidal, Double-ellipsoidal, and Toroidal-bottom designs for large capacity with low head range, meet storage requirements of every size. Consult Pittsburgh-Des Moines *now* for complete assistance in planning your post-war water storage improvements!

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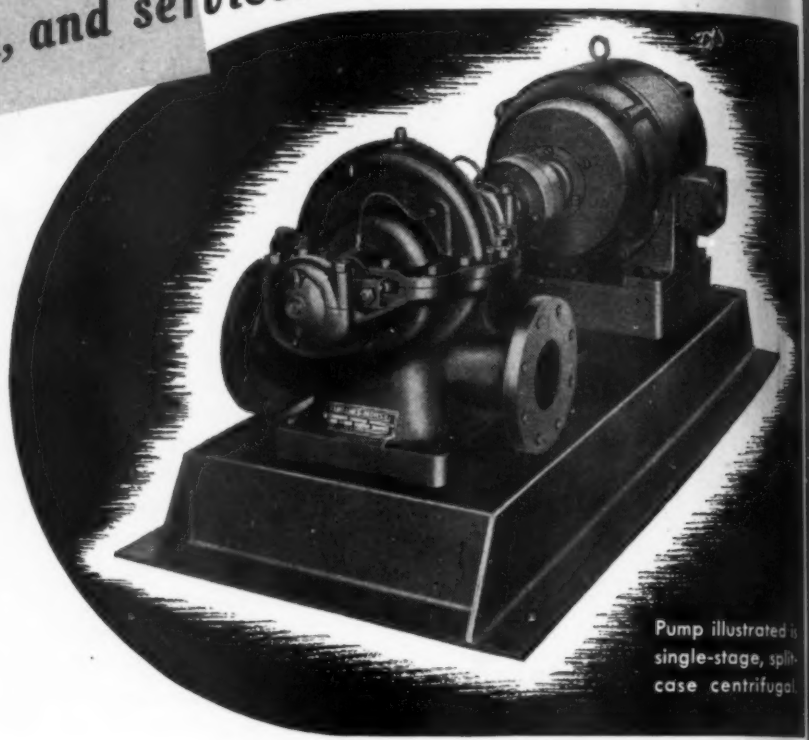
Complete PUMPING UNITS

. . . built, guaranteed, and serviced by ONE manufacturer



Pump illustrated is single-stage, split-case centrifugal.

Fairbanks-Morse complete pumping units offer you much more than sustained high efficiency. There are in addition these three vitally important advantages:

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Fairbanks-Morse

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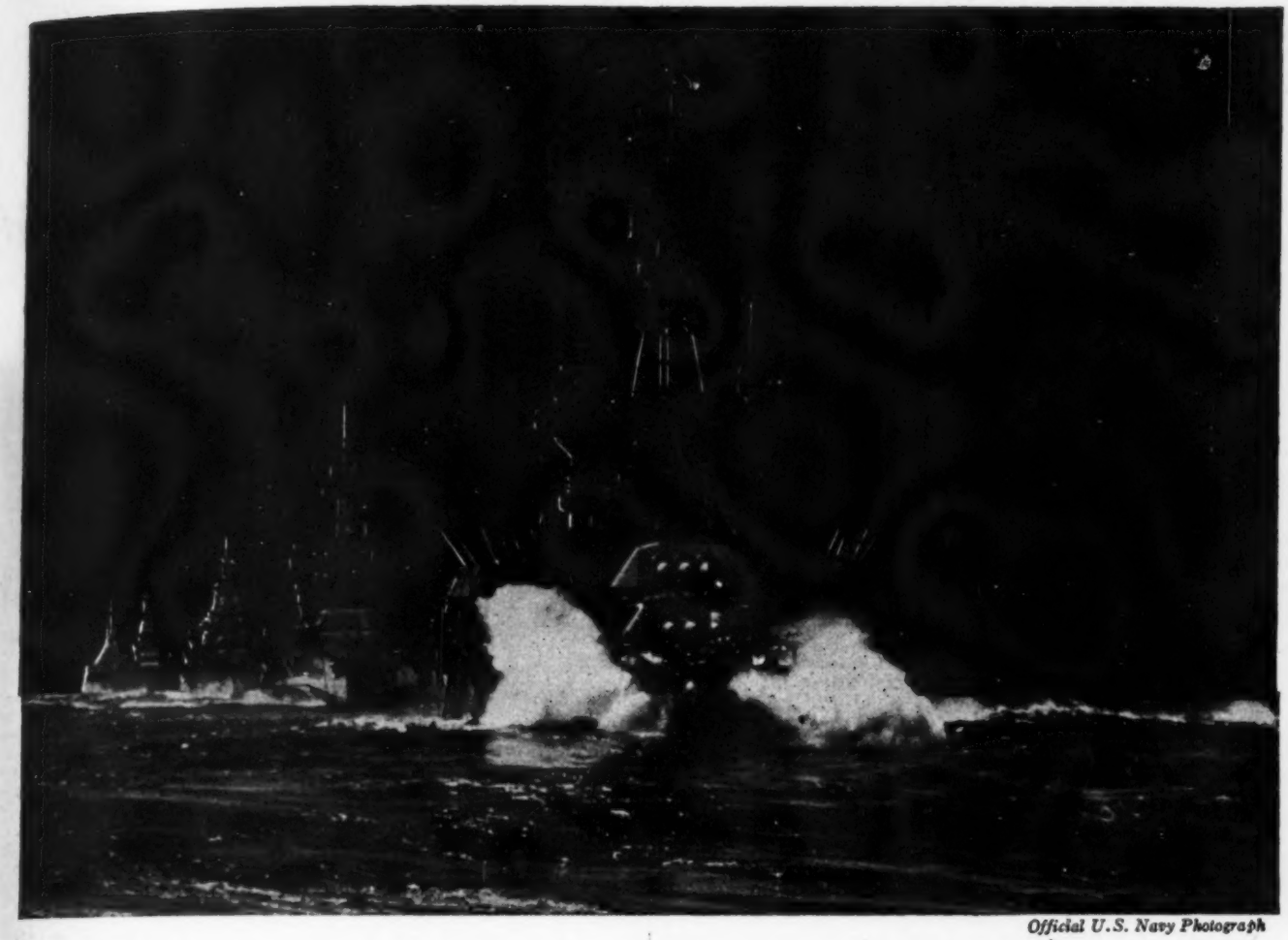
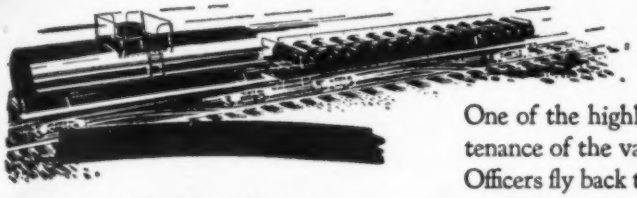
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor
Cars and Standpipes • Farm Equipment



Official U.S. Navy Photograph

Columbia keeps its fleets of Chlorine and Caustic Cars



IN ACTION!

One of the highly important factors in our Navy's successes has been the maintenance of the various fleets at sea for an extraordinarily high percentage of time. Officers fly back to bases in advance of their fleet's return, for example, to assemble supplies for immediate loading.

Columbia, too, speeds the turnaround of its fleets of special cars. Inspection, reconditioning and loading are handled with all possible dispatch in order to increase the productivity of every car.

Customers and carriers have co-operated in speeding turnarounds and rolling up the miles for a most impressive record for these fleets. This continued teamwork, especially while demands on transportation facilities remain high, will be repaid in the delivery of greater volumes of these essential war supplies.

Typical Records . . .

Chlorine Car PPGX 217—
8,742 miles in delivering to eight different industries within 118 days.

Chlorine Car PPGX 223—
8,639 miles in 98 days, also to 8 industries.

Caustic Car GATX 32934—
12,615 miles in 140 days, 14 different industries.

Caustic Car GATX 32941—
10,026 miles, delivering to 18 industries in 140 days.

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GRANT BUILDING, PITTSBURGH 19, PENNSYLVANIA

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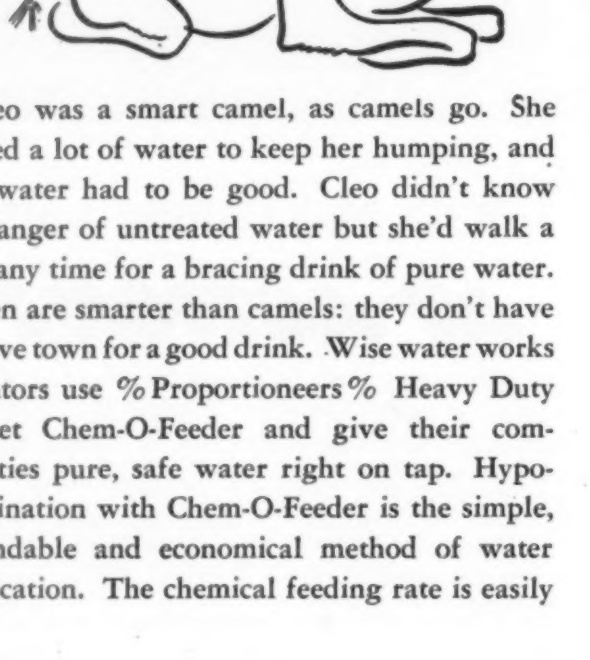
Soda Ash • Caustic Soda • Sodium Bicarbonate • Liquid Chlorine • Silene EF (Hydrated Calcium Silicate) • Calcium Chloride • Soda Briquettes
Modified Sodas • Caustic Ash • Phosflake • Calcene T(Precipitated Calcium Carbonate) • Calcium Hypochlorite

The Camel that walked a mile for a drink..

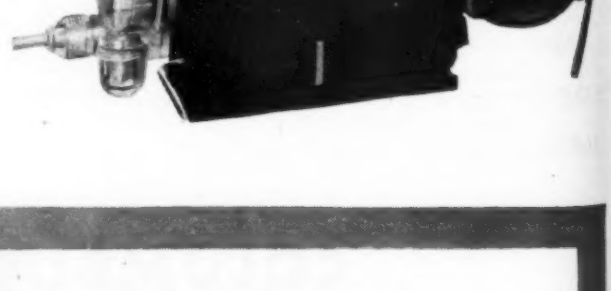


Cleo was a smart camel, as camels go. She needed a lot of water to keep her humping, and that water had to be good. Cleo didn't know the danger of untreated water but she'd walk a mile any time for a bracing drink of pure water.

Men are smarter than camels: they don't have to leave town for a good drink. Wise water works operators use % Proportioneers % Heavy Duty Midget Chem-O-Feeder and give their communities pure, safe water right on tap. Hypochlorination with Chem-O-Feeder is the simple, dependable and economical method of water purification. The chemical feeding rate is easily adjustable and "See-Thru" construction shows movement of valves and the flow of the liquid. By cross-connecting the Chem-O-Feeder to the water pump, automatic injection is accomplished.

End your water treating problems with % Proportioneers % Chemical Feeders... equipment is available for every operating condition. Information on request.

%Proportioneers% Heavy Duty Midget Chem-O-Feeder



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WATER WORKS & SEWERAGE

PUBLICATION OFFICE
330 South Wells Street, Chicago, Ill.
E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

London's Water Supply in Peace and War

Is the story of the safeguarding of the purity of London's drinking water during the war and the blitz. It is the story of operations and carefully planned precautions, not previously disclosed for security reasons. It is the story of why, in spite of terrific damage to the water system, there was no outbreak of water-borne disease in five years of war. It is a story told by the man responsible for the control of water purity over London's vast system—

LT. COL. E. F. W. MACKENZIE, O.B.E., M.C., Ch.B., D.P.H., Director of Water Purification, London.

Heating and Failure of Bearings from Little Suspected Cause

Is certainly to be news to most of our readers, for the little suspected cause of bearing heating and failure is often due to pitting of the bearing face by a form of electrolytic attack traceable to shaft currents that travel a circuit through bearings and shafts of motors and generators. A method of testing for the presence of such shaft currents and a simple means of elimination of the damage to bearings by shunting the current flow is described by—

D. B. HOOVER, Engineer,
Westinghouse Elec. Co., Pittsburgh, Pa.

Straight from Our Readers

Is another of those compilations of opinions of certain readers of *Water Works and Sewerage* who have been questioned or interviewed by a representative of this magazine on several phases of plant operation and maintenance, experiences with various units of equipment, etc. The next of the "Straight from Our Readers" series concerns "Sludge Handling"—now, as ever, a topic of prime consideration to all plant operators.

Good Operators Don't Work!

Is an intriguing title for an article that bids fair to give many sewage works operators something to think about. Most of us have at one time or another "tried everything in the book" and followed every bit of expert advice offered in trying to make a sewage plant behave as it should—to find our reward to be only disappointment. When the supervisor of one plant "decided to let the thing go dirty" he was in for a great surprise—and, in so doing discovered that Nature still has a way of taking care of itself. In the course of events and observations something of considerable value was learned concerning the most effective operation of the lowly primary tanks, and the marked effect therefrom on the activated sludge process and performance of the entire plant. The author is—

CHAS. H. CAROTHERS,
Consulting Bio-Chemist, Miami, Fla.

The Reduction of Chemical Odors

Is an account of an evaluation of various methods of removing foreign odors from a water supply polluted with chemical wastes. The results from plant scale tests of the most promising schemes indicate the relative values of "break-point" chlorination, activated carbon, and filtered water aeration under high pressure, to secure maximum atomization of the water, as against ordinary aeration. The authors are—

LAWSON HAYNES, Plant Supt., and
WALLACE GRANT, Chemist,
West Va. Water Service Co., Charleston, W. Va.

The Hazen-Williams Hydraulic Slide Rule

Is apparently owned by a number of engineers, a good many of whom have lost or misplaced the booklet of instructions on the various uses to which the slide rule may be put and examples of manipulations for making computations with this useful device. In view of this it has been suggested to *Water Works and Sewerage* that it would be performing an appreciated service if it would reprint these instructions. In consequence this is to be done in an early issue.

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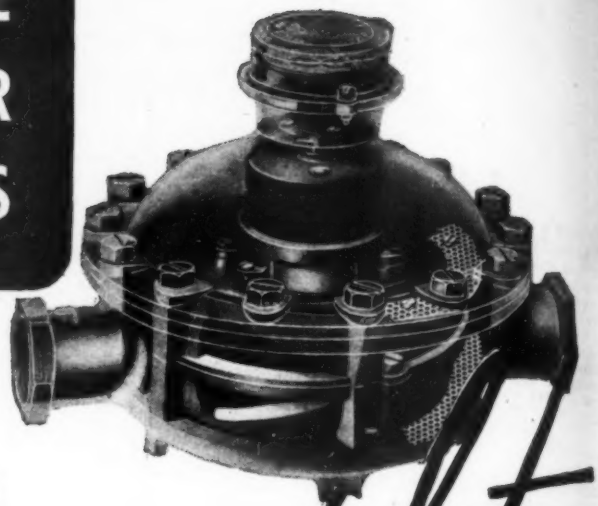

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IS A FEATURE OF TRIDENT 1½" and 2" STYLE 3

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OVER 6½ MILLION TRIDENT METERS SOLD THE GREAT MAJORITY STILL IN SERVICE

WATER WORKS & SEWERAGE

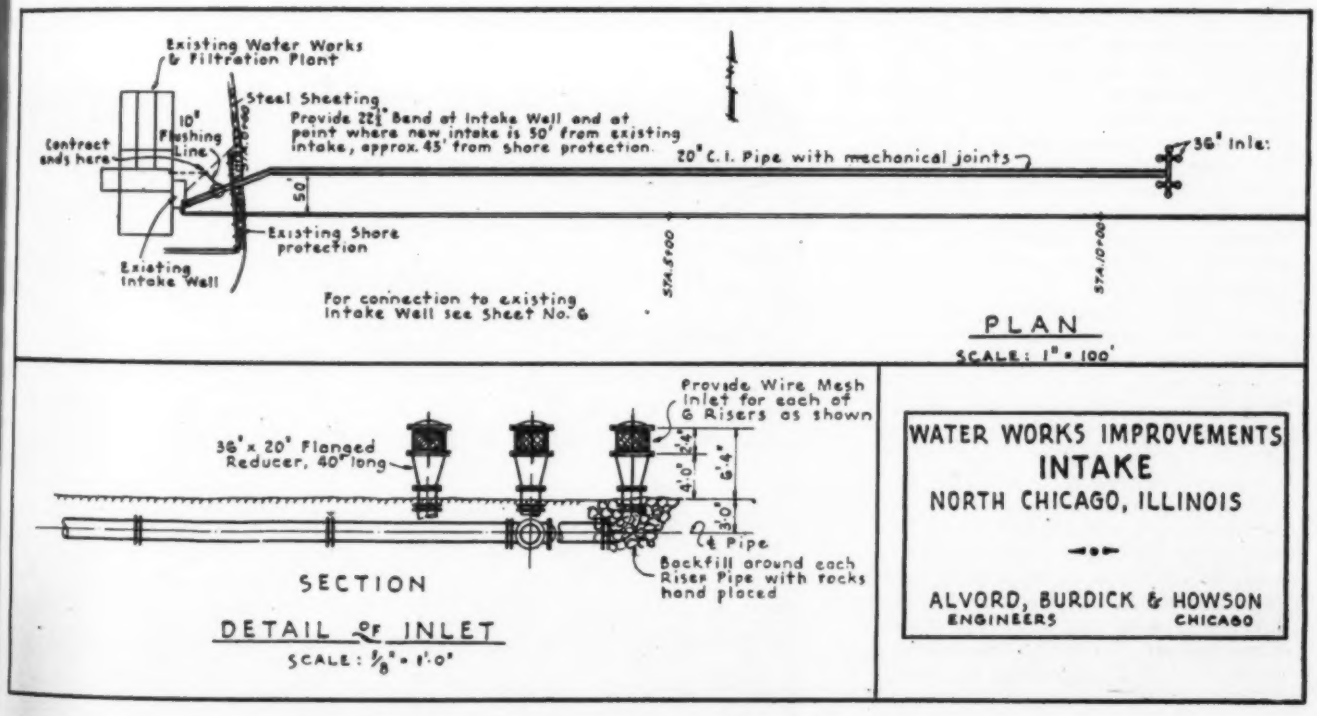
VOL. 92, No. 9 — *A Gillette Publication* — SEPTEMBER, 1945

NORTH CHICAGO DOUBLES ITS WATER SUPPLY FACILITIES

By CHARLES HEBIOR
Sup't of Filtration and Pumping
NORTH CHICAGO, ILL.

NORTH CHICAGO, a suburb of the metropolitan city, located 30 miles north along the shore line of Lake Michigan, has increased the capacity of its water supply from 2,400,000 gpd. to 4,500,000 gpd. This new expansion program was necessitated by the increased demand of several war industries and will cost over $240,000.00. The existing filter plant was constructed in 1937 and had a capacity of 2,400,000 gallons. It was built as a W.P.A. project and inaugurated the use of Lake Michigan water for the community. Prior to 1937, deep wells had been used as the source of supply which furnished a water that was very hard and objectionable for industrial uses. The new Lake Michigan supply was much softer and used in such large volume by the industrial plants and by the citizens that the capacity of the system was exceeded after only seven years of operation. At the time Lake Michigan water was first supplied, the daily pumpage from the wells was 350,000 gpd. A soft water supply has now increased the pumpage to 2,400,000 gpd. and when all of the new equipment is installed the daily send-out will be over 3,500,000 gpd. with peak demand periods of 5,000,000 gpd. rate.

The new construction involved the installation of a second intake line of Cast Iron Mechanical Joint Pipe extending 1,200 feet out into Lake Michigan with six special inlet fittings at the end of the line; additional settling basins and clear-well capacity; two



Plan of New North Chicago Intake and Detail of Screened Inlets
(1,200 feet of 20-inch flexible bolted joint cast-iron pipe.)

One of the New Filter Operating Tables

mgd. gallon filter beds, piping and filter house addition; a 1,000,000 gallon concrete surface reservoir located on the west side of the city at a high elevation and one mile of Cast Iron connecting mains between this reservoir and other parts of the connecting mains.

Intake Laying

(See Cover Picture)

The first filter plant constructed in 1937 had been provided with a 16-inch light weight metal intake line extending out into the lake for several hundred feet. This intake had proved unsuccessful, as on two or three occasions this line had floated to the surface. The new 20-inch intake line was installed of heavy weight Cast Iron pipe with mechanical gland-type joints. This pipe line was installed by the Edward E. Gillen Co. of Milwaukee who have had many years experience in constructing docks, intakes and other hydraulic structures along the Lake Michigan shore line. Work was started in December during cold weather and some of the work was performed with the temperature reading 12 below zero. A large barge having a derrick with a 75 ft. boom was used for handling the work. The barge was maneuvered into position by tugs and then held at the correct alignment by four anchors. A clam shell bucket was used for excavating the trench along the bottom of the lake from the filter plant out to the point of the intakes. This trench was dug in a hardpan or a shale which was difficult to excavate. On some days it was necessary to spend 12 hours to excavate a 72 ft. length of the trench. After the trench had been excavated to the proper elevation the pipe was installed in 72 ft. sections made up of four lengths of 18 foot pipe. These pipe sections were assembled on the deck of the barge and three wire cables attached for handling by the derrick into the trench. Divers were used for attaching the assembled sections to the pipe already installed in the trench. These men carried to the bottom of the lake as working tools two wrenches for bolting the pipe together and a high pressure water line for removing any dirt around the ends of the pipe and for leveling off the bottom of the trench so that the finished pipe line would be straight and true. After the sections were connected the trench was backfilled with sand and the other excavated material. A typical working day usually accomplished the installation of one 72 ft. section of pipe. The job was completed in a two-month period.

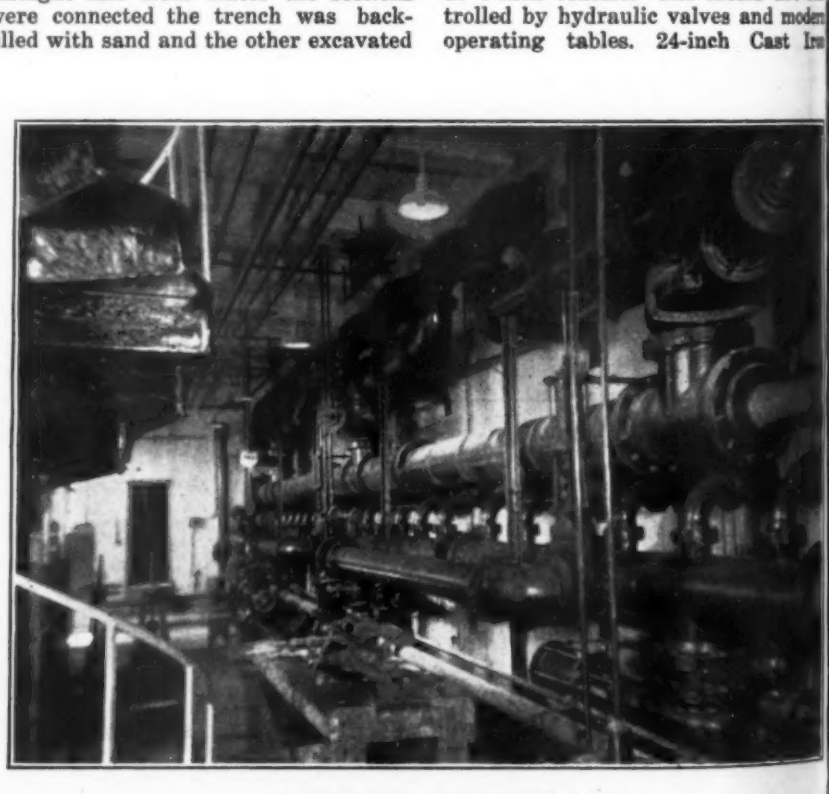
At the end of the line six fittings were installed with a section of screen 36 inches in diameter and 2½ ft. in length attached to each of these fittings. These screens are 8 ft. below the surface of the lake and are protected by a large fill of crushed limestone having a diameter of 4 to 6 inches.

A leakage test was conducted on the line after completion by extending a riser pipe at the shore end and filling the entire line and riser pipe with water. The height of the riser was such as to give a 10 pound pressure on the line. The water level in this riser dropped only ¼ inch in a one-hour period which showed the intake to be practically bottle tight.

The installation of a lake intake line in the middle of winter requiring the use of divers may seem an unbearable job, but the divers working on the bottom of the lake were far more comfortable than the helpers on the barge with the icy wind and temperature near zero all the time and on some days as low as 12 below zero.

Filter Plant Improvements

The improvements to the filter plant proper consisted in the addition of two filter beds of 1,000,000 gallons capacity each being 18-ft., 8-in. square, provided with a Cast Iron manifold and lateral underdrain system. The laterals were made of 2½-inch pipe placed on 8-inch centers with ⅜-inch perforations at 6-inch centers. The filters are controlled by hydraulic valves and modern operating tables. 24-inch Cast Iron



Pipe Gallery—North Chicago

effluent and 24-inch influent lines connected these beds with the settling basins. The new settling basins were of double deck design type. They are 70 ft. long, 13 ft. wide and 22 ft. in height. The clear well capacity was increased from 260,000 gallons to 300,000 gallons. Lake Michigan water has a turbidity ranging from a maximum of 200 ppm. on windy days down to a minimum of 8 or 9 ppm. in calm weather, with an average of 20 ppm.

Chemical Feed Equipment

New chemical feed equipment was installed of ample size to take care not only of the two new filters but also of the three existing filters. This equipment consisted of two dry feeding machines of the gravimetric type for the feeding of alum and a third machine of similar construction for the feeding of carbon; also a dust removal system was installed. The old solution feed equipment has been removed and the space occupied will be reconverted into a chemical storage room. An improvement in the taste and odor treatment will be made by the addition of prechlorination with the installation of two large- capacity chlorinators in addition to the present equipment. The water will now be prechlorinated, treated with carbon, filtered and postchlorinated. The use of carbon is necessary for the removal of chemical tastes imparted to the water by industrial wastes discharged into the lake from large manufacturing concerns in the vicinity. The filter plant buildings and concrete work were constructed under contract by the Peter Hamlin Construction Co., with all piping and filter equipment being installed by the Pitt Construction Co. The installation of the new filter beds and inter-connecting pipe required the closing down of the plant for a one-week period. During this time the Great Lakes Naval Training Station which abuts the city water department property on the south supplied the demand for the town. This was in return for services supplied by the city to the Navy while they were in the midst of their extensive construction program a year or two before, when they were supplied with large quantities of water by the city.

Diver

(*Ready to descend to bolt together one of the 72-ft. sections of 4 lengths of pipe jointed on the barge and lowered as a unit.—See cover picture.*)

Chemical Analysis of Filtered Water

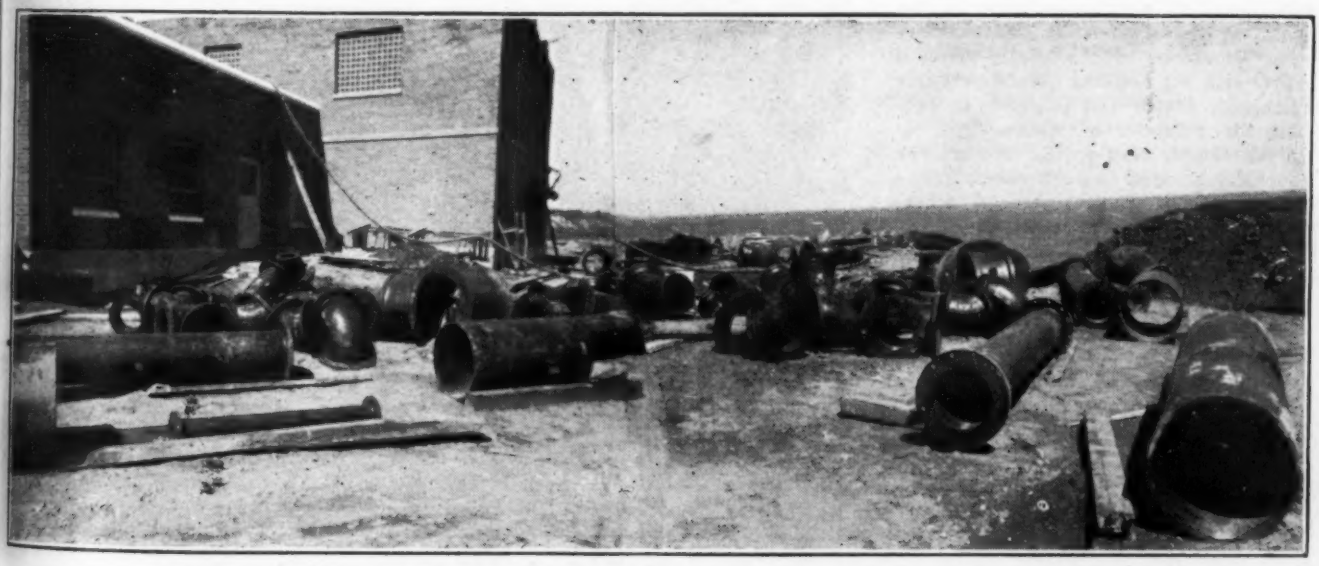
pH	7.6	Alumina	0.4	Sulfate	17.9
Total Hardness	127.0	Calcium	33.2	Nitrate	0.5
Total Residue	151.0	Magnesium	10.9	Chlorides	4.0
Iron	0.0	Sodium	11.3	Alkalinity (M. O.)	116.0
Manganese	0.0	Silicon	4.4	Potassium	7.9

Storage Reservoir

A 1,000,000 gallon reinforced concrete reservoir was constructed on the west side of the city and provided with booster pumps for automatic operation so that water could be taken from this surface reservoir and delivered to the elevated storage. One mile of Cast Iron pipe ranging in size from 8 to 12 inches was used in connecting this reservoir with the balance of the system and also for tying in three large industrial organizations. The Abbott Laboratories, large manufacturers of penicillin and sulfa drugs used by the military forces, are buying over 1,000,000 gallons of water per day from the plant and will increase this amount when the additional pumping capacity has been installed in the plant. The Fansteel Corporation is another large water consumer, manufacturing alloy steels for special military purposes. All water mains were laid with 5 ft. of cover on account of frost, and lead and jute joints were used throughout the installation. The contract for this section of work was let to Walter E. Huhn of Waukegan.

The work is now all completed with the exception of installing one high service pump after which the plant will have a filter capacity of 4,500,000 gallons per day and a pumping capacity to the distribution system of 9,000,000 gallons. This is a far cry from the water supply of the city back in 1901 when North Chicago was a village of 250 voters and the water supply system had a capacity of 100,000 gpd.

The engineering work was performed by Alvord, Burdick and Howson of Chicago, with Mr. D. H. Maxwell in charge. Mr. John P. Dromey is Mayor and Mr. L. J. Bartlett is Chairman of the Water Board.



Rear of New Filter Plant Addition, with Yard Full of Cast Iron Fittings and Specials

THE PROTECTION OF MOTORS AND CONTROLS AGAINST MOISTURE

Introducing a New, Inexpensive System Now Available to Water and Sewage Plants

H. V. CRAWFORD
Applications Engineer
GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

RARE indeed are plant operators who fail to realize that the proper protection of their motors and controls is of utmost importance. Especially is this true in these days when these units are hard to get and repairs constitute a problem. Most operators know only too well how important it is to keep motors and control equipment from becoming overheated from internal or external sources. The dangers resulting from inadequate lubrication are also rather well known, but the dangers resulting from overlubrication also should be clearly understood by every operator. This is extremely important, since accumulations of oil or grease, because of overlubrication, will rapidly injure the winding insulation of motors.

The Author

Even after these considerations have been properly recognized, full protection will still not be provided unless the danger from moisture is adequately stressed. Almost every operator realizes that rain and water must be kept from dripping or splashing on motor windings. All motors installed in the open, or where splash or spatter may occur should be of the totally-enclosed type, with all housing joints properly machined, fitted, and painted, to prevent the entrance of water. The totally-enclosed, fan-cooled motor can generally be used in such cases, unless the motor must be installed where actual flooding may occur and interfere with the operation of the fan.

In practically all cases where motors for water works use can be installed indoors, standard open motors are usually satisfactory. However, in sewage plants—depending upon the process employed—motors of every type of mechanical and electrical construction may be required. Many splash-proof motors have been applied to pumps in water plants simply because it was felt that since the motor was to drive a pump, it should have positive protection from moisture in case of accident.

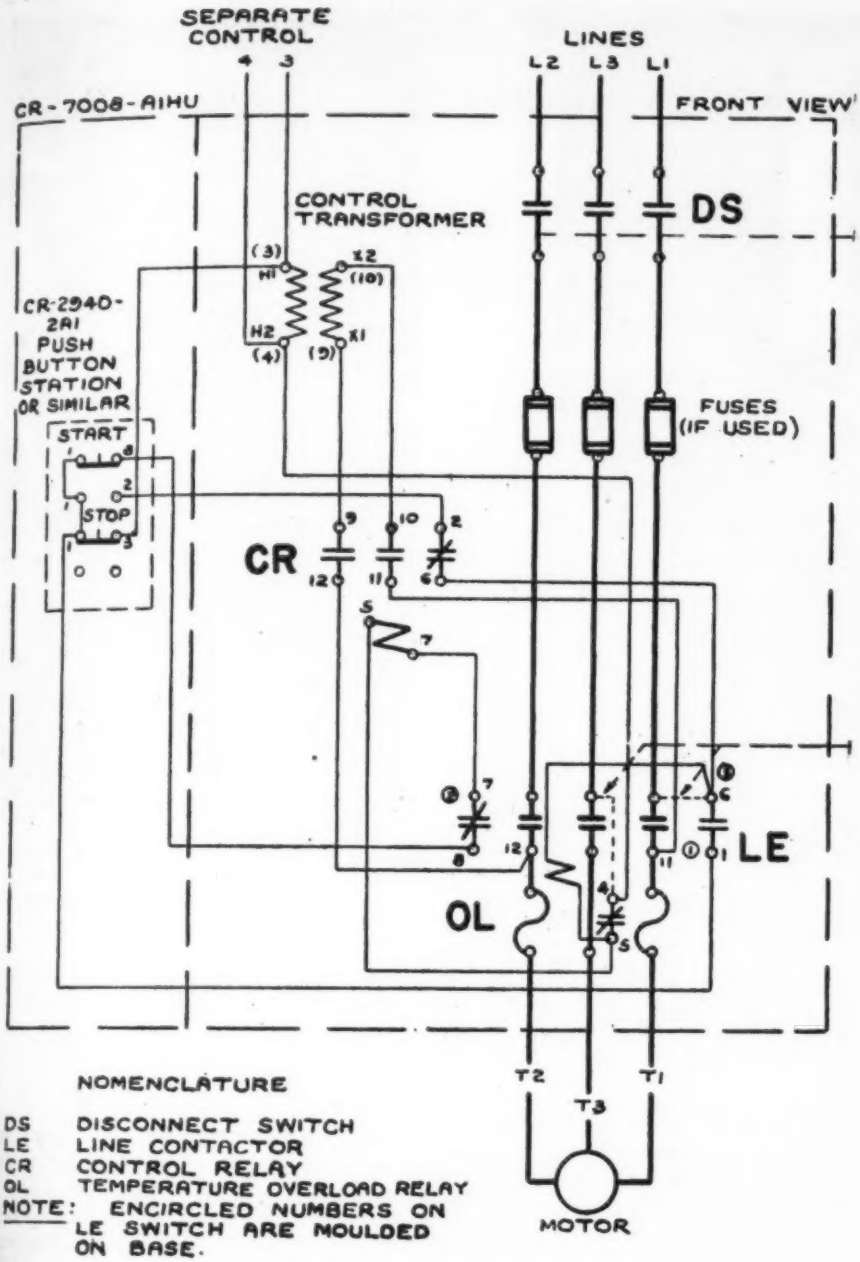
Practically all motors intended for driving pumps in water and sewage plants may be of the standard open type. For other processes in sewage plants, however, the motors may be of the totally-enclosed (fan-cooled) type to provide protection against water or dust from dried ash or sludge, or of the totally-enclosed, non-ventilated, explosion-proof type to provide protection against explosive sewage gas. Such motors driving digester gas boosters are pictured herewith.

What Constitutes Effective Protection Against Moisture?

While most operators appreciate in a general way the importance of protecting motors from moisture, many of them do not fully appreciate what constitutes just the *right kind* of protection. Just because an outdoor type of motor is totally enclosed, or is of the open type but located in a dry spot, does not mean that the insulation will not deteriorate because of the *absorption* of moisture. On the other hand, neither does it mean that if a small amount of water condensate should accumulate in the bottom of the motor, or that if the motor is located in a room in which high humidity prevails, that the winding will deteriorate because of such moisture.

Consequently, protection from moisture resolves itself into the problem of keeping the insulation from *absorbing* enough moisture to cause deterioration and thus result in the motor burning out. To avoid this condition, the motor should not only be protected from falling or splashing water, but, in addition, it should be installed in a warm room or operated up to normal temperature at least once each week, in order to dissipate any moisture or condensation which may have accumulated on the insulation. This accumulation may be enough under some conditions of installation or mechanical construction to cause the insulation to break down if the motor is operated only infrequently, or is not kept sufficiently warm while standing idle.

Totally Enclosed "G-E" Explosion Proof Motors
(*Driving gas-boosters in a sewage plant*)



Wiring Diagram of Dry Motor and Control System
(*Protected units in sewage plant appear in next picture*)

The foregoing applies to all motors, but especially to those operating on 550 or 2300 volts and above.

When motors are operated only infrequently and, in addition, are located in an extremely damp place, or in the open where the temperature of the motor housing will vary over a wide range from day to night, adequate protection should be provided by applying heat to the windings when the motor is not in operation. In many storm sewage stations, sewage storm reservoirs, and similar locations where the motors normally are operated only a few times a year, it should be the practice either to run the motors at stated intervals in order to dry them out, or to equip them with space heaters.

Automatic Heat Drying of Motor Windings

It is better still to employ a control system which will automatically supply low voltage to the motor, so that a very small amount of current will flow through the windings when the motor is not in operation. Functioning automatically, this arrangement supplies only enough current to keep the insulation dry. It is, therefore, much more efficient than using space heaters. With this arrangement, the heat radiates from the wire and passes out through the insulation. Just as long as the temperature of the insulation is raised above the ambient temperature, the moisture absorbed will not be enough to cause the insulation to deteriorate to the point where it will break down when full voltage is applied to the motor.

When space heaters are used, extra conduit and wiring is necessary in order to apply current to the space heaters. On the other hand the special control system uses the same wires from the starting control to the motor to apply the low voltage to the windings when the motor is idle.

The accompanying wiring diagram of the control represents an actual installation of this type of heating system, giving protection to two small 5 HP. motors in a sewage plant. This diagram shows a small transformer connected across the 110-volt lighting circuit, in this particular case, but the transformer can be just as well connected across the source of supply used in operating the motor. The secondary of the transformer has several taps, and the proper voltage (10 or 12 volts, or even somewhat higher) can be secured through contacts of a relay to the motor windings, while the motor is stationary. When it is necessary to start the motor, the starting button is pushed, but before it makes contact and supplies normal voltage to the motor it breaks contact to the small relay coil, thereby disconnecting the low voltage supply to the motor windings. When the button is pushed all the way in, contact is then made through the operating coil of the starter. The starter then closes and supplies normal voltage for starting and running the already warm motor during the time it is required to operate.

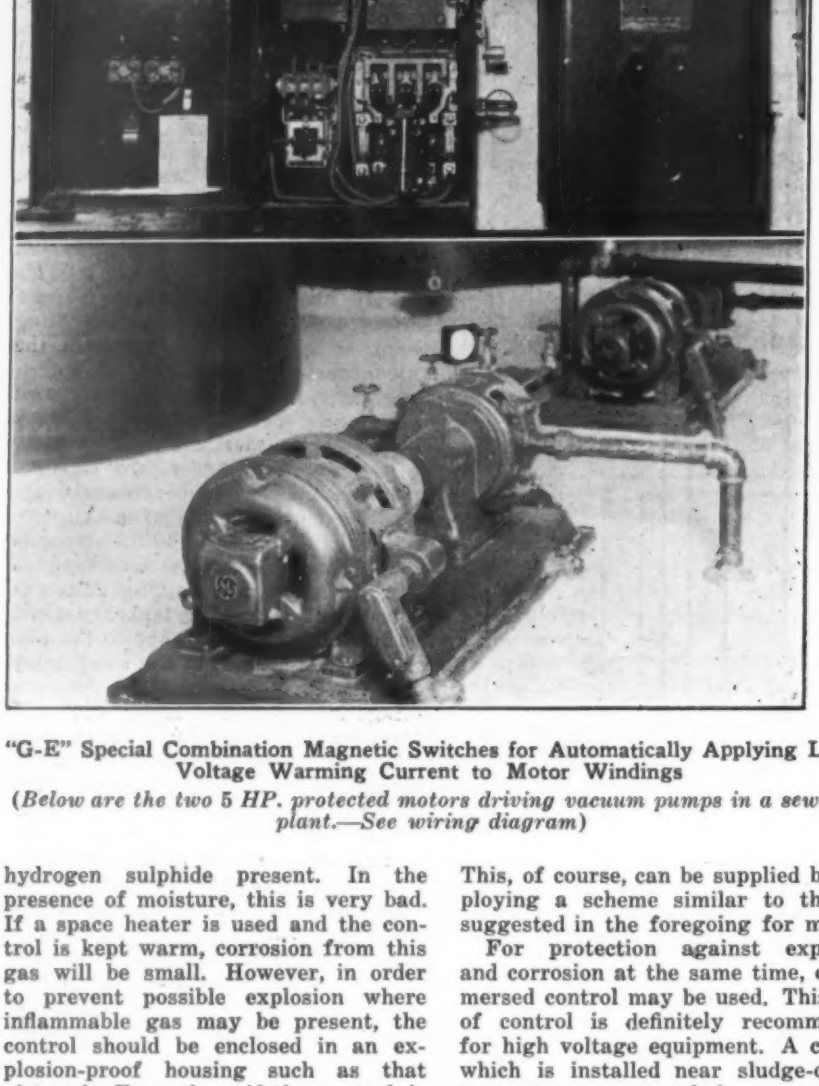
When the stop button is pushed, the reverse operation takes place. Line voltage (not over 600 volts) is first removed from the motor, then low voltage from the small transformer is automatically supplied to the motor windings.

Cost of the System and Its Operation

The cost of the extra control feature is nominal and the savings obtained in power economy will in a short time compensate for the extra cost of the feature. It should be pointed out that the small transformer will supply enough heat to also keep the control equipment in the starter in first class condition.

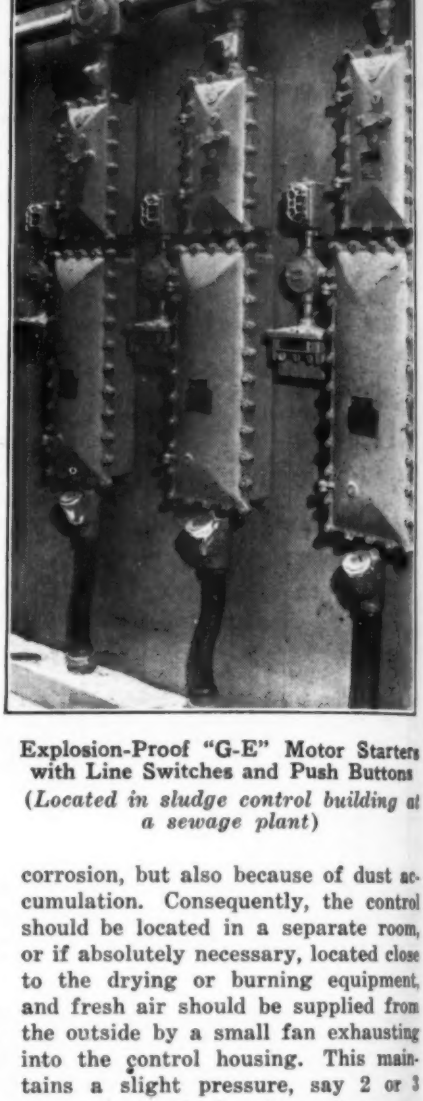
In regard to the protection of the control, most of the points mentioned for motors apply here also except that space heaters will in most cases meet the requirements. In all cases the control should be enclosed and protected from dripping or splashing water. In general, however, the control is of low voltage, and if operated every few weeks not enough corrosion will result to cause the control to stick. The small amount of heat in the cabinet will keep the insulation on the coils from absorbing sufficient moisture to cause appreciable damage.

It is important that the control should be protected from corrosion caused by sewage gas—principally the



"G-E" Special Combination Magnetic Switches for Automatically Applying Low Voltage Warming Current to Motor Windings

(Below are the two 5 HP. protected motors driving vacuum pumps in a sewage plant.—See wiring diagram)



Explosion-Proof "G-E" Motor Starters with Line Switches and Push Buttons

(Located in sludge control building at a sewage plant)

hydrogen sulphide present. In the presence of moisture, this is very bad. If a space heater is used and the control is kept warm, corrosion from this gas will be small. However, in order to prevent possible explosion where inflammable gas may be present, the control should be enclosed in an explosion-proof housing such as that pictured. Even then, if the control is not operated frequently, a small space heater inside the casing is advisable. This, of course, can be supplied by employing a scheme similar to the one suggested in the foregoing for motors.

For protection against explosion and corrosion at the same time, oil-immersed control may be used. This type of control is definitely recommended for high voltage equipment. A control which is installed near sludge-drying apparatus, or near sludge or garbage burning incinerators, will sooner or later give trouble not only because of corrosion, but also because of dust accumulation. Consequently, the control should be located in a separate room, or if absolutely necessary, located close to the drying or burning equipment, and fresh air should be supplied from the outside by a small fan exhausting into the control housing. This maintains a slight pressure, say 2 or 3 ounces, inside the housing and prevents the entrance of dust and gas fumes.

U-1 Order to Be Revoked Sept. 30

Announcements from the WPB office on Aug. 23 and 24, carried the welcome news that Utilities Order U-1 will be revoked on Sept. 30, 1945, if not before, as a result of the surrender of Japan. No longer will it be necessary to have approval on Form WPB-2774 for plant additions of any value. And all other orders are scheduled for revocation on or before Sept. 30.

At the same time AA preference ratings and CMP allotment symbols expire, and all AA preference ratings and CMP allotment symbols on purchase orders scheduled for delivery after Sept. 30 are invalidated.

A new preference rating CC is established, to be assigned by the War Production Board when necessary in unusual cases for essential non-military purposes including reconversion. After Sept. 30 there will be only three preference ratings, CC, MM, and AAA.

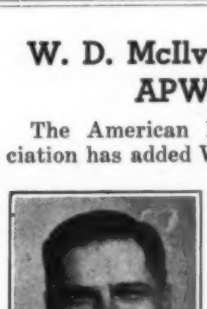
The inventory restrictions contained in the MRO orders, including Order U-1, will be replaced by a general inventory control established by a Priorities Regulation applicable to all industry. This will be explained later.

Bogert-Childs Engineering Associates

Announcement has been received from Clinton L. Bogert and Fred S. Childs, members of the Amer. Soc. C.E., and AWWA, and Fed. of Sewage Works Assns., of the formation of the Bogert-Childs Engineering Associates, to be located at 624 Madison Ave., New York 22, N. Y., for consulting practice in water supply and sanitary engineering.

W. D. McIlvaine Ass't Dir. APWA Staff

The American Public Works Association has added William D. McIlvaine, Jr. to its staff as Assistant Director. Mr. McIlvaine is a graduate of the University of Minnesota, and earned his Master's Degree at that Institution. He has been employed by the University of Minnesota, the Minnesota State Highway Department, and since 1933 by the Minneapolis-St. Paul Sanitary District, his last position there being Ass't Engineer and Acting Mech. Engineer in charge of engineering and maintenance.



ELECTRONICS IN WATER SUPPLY AND SEWAGE TREATMENT*

A Review of Developments in Electronic Instrumentation and Predictions Hazarded of Things to Come

By D. M. NIELSEN
Electronics Division
THE FOXBORO CO.
FOXBORO, MASS.

TO begin on a factual plane I shall talk about electronic instruments already on the market. In this I have the idea of comparing these with earlier mechanical instruments of the same general type, and also the idea of pointing out the probable result of design trends already apparent.

The Author

In general, there is not much that is electronically new in the construction of modern electronic measuring instruments. The variables measured are voltage, resistance, inductance, and capacitance. And the bridge and potentiometer circuits used to measure them are much the same as in earlier mechanical instruments. The rather paradoxic result is that the main changes in instrument construction caused by the use of electronic techniques have been mechanical rather than electrical.

To bring this comparison into focus, I will compare the Wheatstone bridge instruments of the galvanometer type and of the newer electronic type. Both of these are so-called "null-balance" instruments, in which an unknown electrical resistance is measured by automatically balancing it against an adjustable standard resistance in the instrument, to produce a resulting zero or "null" voltage.

In the mechanical instruments, the amount and direction of any lack of balance is detected by a galvanometer, which is a rather delicate and weak unit. The position of the galvanometer pointer is periodically felt by a system of sensing fingers, which then mechanically adjusts through an intermittent clutch system the standard slidewire resistance to restore balance.

The design and operation of this mechanism is much like that of a fine machine tool. Precision machine work and skilled assembly are absolute requirements during manufacture And skilled operation and maintenance are needed to retain the original calibration accuracy during the life of the instrument.

Five vs. Twenty-five Moving Parts

In the electronic instrument, the galvanometer, the sensing fingers, and the intermittent clutch system are all replaced by an electronic unit with no moving parts. For direct comparison, in Foxboro electronic instruments there are only five moving parts, where our equivalent galvanometer type instruments have twenty-five moving parts.

One result of this obviously great simplification through the use of electronics is that in these new instruments, there is no greasing or lubrication of gears or bearings, no cleaning or greasing of slidewires or slidewire contacts, no changing of motor brushes, and no wear and replacement of gears or cables. In fact, we believe that no mechanical maintenance whatever will be needed normally.

And Other Advantages

But this simplification and resulting elimination of maintenance is not the main advantage of using electronic techniques in instruments. The important gains are:

(1) in instrument performance—dynamic measuring action with continuous high-speed response plus immunity to vibration.

(2) entirely new methods of measuring.

In galvanometer types of potentiometers and bridges, the pen speed is from 10 to 30 seconds for travel across full chart. In electronic types, 3 to 5 seconds for pen travel is general and some types of instruments will give full scale pen travel in less than one second.

In galvanometer types of potentiometer recorders, the narrowest practical range is of the order of several thousandths of a volt. In one new electronic potentiometer recorder, the range for full chart is one millionth of a volt. In galvanometer types of Wheatstone bridge recorders, the narrowest temperature range has been about 20° F. In electronic types of equivalent instruments, the narrowest range is a small fraction of this same 20° spread and the limit has by no means been reached. In elastic spring pressure recorders, the top pressure which can be measured is about 20,000 lbs. per square inch and the lowest pressure scale width is about 1/10 in. of water. With electronic instruments, the maximum pressure that can be measured is now well over 100,000 lbs. per square inch and the minimum pressure is approximately 1/10,000 in. of water. And similar comparisons might be made for other types of measurements.

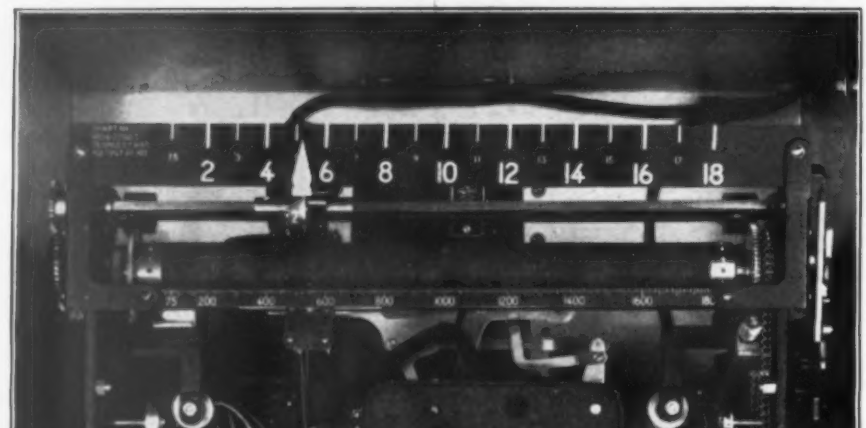
With these gains in measuring speed and increased sensitivity, the measuring accuracy of all the new electronic instruments is at least as good as the less sensitive galvanometer types. And in many cases the accuracy is higher for the electronic type.

Much of this gain in performance is directly the result of the inherent characteristics of electronics. For example, a very simple vacuum tube amplifier can take a very small voltage (of the order of a millionth of a volt) and amplify this millions of times with very little distortion, with high stability, and with a very low power level required in the input to the amplifier. During the past ten years, the mechanical design of vacuum tubes has improved so that they are now very sturdy and highly immune to vibration. Also, vacuum tube action is so fast that the commonly used tubes will amplify AC voltages with frequencies as high as hundreds of millions of cycles per second.

Broad Picture Developing

But looking broadly at electronic instruments with their sensitivity, accuracy, and speed far beyond old standards, we can see a broad picture developing. There is the basic idea of working toward a *universal* electronic instrument to measure any and all process variables. Several companies are now making progress in this direction. Another trend is the electrical measurement of variables such as pressure, liquid level, flow, weight, etc. This makes possible the centrallizing of a large number of measurements in a control room with simple wiring connecting sensitive elements at the points of measurement to an indicator or a recorder in the control room. With

*Acknowledgment: This paper, read before the New England Water Wks. Assn., is being printed with the permission of the Association.



Interior of Typical Mechanically Balanced Instrument
(Note complexity in comparison with the electronic instrument)

suitable selector switches a number of different measurements can be recorded on a single instrument or variables at many scattered points can be quickly checked with a high speed indicator. Still another trend is the use of electrical means of continuously adding, subtracting, or taking ratios of two or more separate measurements and recording the result of this mathematical operation.

As possibly the most definite indication that these advantages are very real, I might say that out of the seven major instrument companies, six now have on the market electronic measuring instruments.

But I cannot in honesty leave you with the picture that pressure spring instruments are fated to disappear in favor of electronic types. Overlooking for the moment the fact that these two types have different levels of performance, we feel certain that it does now and will continue to cost more to make a good electronic instrument than it does to make a good spring type recorder. The apparent difference in price between mechanical instruments and the electronic types may well be decreased by the use of mass production methods for electronic instruments, but it is difficult to imagine that this difference will approach the disappearing point. And if this assumption is correct, the use of these two types will depend on an economic choice based on the performance requirements, the first cost of the equipment, and the cost of maintenance. So the immediate market for electronic instruments is to replace the equivalent types of galvanometer instruments in which mechanical balancing systems are used.

ELECTRONICS IN THE WATER WORKS INDUSTRY

Having used the instrument industry as a guinea pig to see the effect of a large injection of electronics, we can now go afield and look ahead at what will likely happen in the waterworks field. And probably the easiest way to start is with instruments.

In pH Measurement and Control

By applying electronics pH measurement is an example of laboratory technique, which has now put on overalls and gone out into the factory.

To all of us except the technically precise, pH is simply a measuring unit for expressing the degree of alkalinity or acidity of a water solution. Several types of electrodes have been developed to measure this variable by producing an output voltage related to the pH value of the solution. Of these various electrodes, the glass electrode has been developed today to where it is the most widely useful. But glass electrodes have one great problem, which is their very high electrical resistance and very low permissible output current. Today, for general plant use the vacuum tube amplifier units have completely superseded the sensitive and very delicate light beam galvanometers first used in the laboratory.

During the past fifteen years, reliable and sturdy glass electrode pH instruments of both portable indicating types for laboratory use and continuous recording types for plant use have been developed. And with no exception that I know about, all of the designs have been based on the use of electronics.

The water works industry has a large stake in the successful development of these instruments. Some of you use water into which industrial wastes varying greatly and erratically in quantity and chemical strength are discharged. These wastes can upset filter plant action or cause organic growths. PH measurement is the most powerful tool available to control the neutralizing of chemical wastes or the chemical dosing of organic wastes in treatment plants. Then, too, there is the important relationship of pH in corrosion control, and in water softening. In sewage treatment pH is important as an indicator of digester and aeration tank behavior and in sludge dewatering operations.

Telemetering

It is probable that there will also be an increasing use of electronic techniques in telemetering equipment for the transmission of measurements of flow, level, and other variables over long distances. It has been our own opinion that all telemetering equipment up to date has been rather unsatisfactory. And the reason for this has been not the transmitting and receiving instruments, but rather the vulnerability of the transmission line to many sorts of failure. In general, telephone circuits or special 2-wire circuits have been used for transmission of these measurements. Typical troubles are line failures caused by lightning, breakage of wires by snow, wind, or falling trees, short circuits or damage by birds or animals, and malicious damage by humans.

The obvious function of electronics in telemetering is to eliminate the transmission line with its failures and to use instead radio transmission. This equipment should be available immediately after the war, as all the engineering and application problems have already been worked out. Radio telemetering systems have been in use in the far West for some years for reservoir level and dam gate position measurement. The transmitters are unattended battery powered units, which transmit readings at regular intervals. The batteries are replaced about once every six months and the transmitter is inspected and serviced then. Two companies now have on the market equipment of this type.

An even more convincing proof of the reliability and sturdiness of unattended radio transmitters is that the Coast Guard is now using radio beacon buoys. These transmit radio code signals, which are picked up by direction finders on boats. These transmitters again are unattended except for periodic battery replacement. I think you will agree that this service is more severe than any found in a water system.

Another type of electronic telemetering, which has proven very reliable is carrier current equipment. This is guided radio transmission. A weak radio signal is coupled to a power transmission line, along which it travels. Several such signals can be transmitted over the same wire without interference with each other or with the flow of electric power in the same line. These radio signals will jump short gaps in the line, such as open switches or breaks or grounds.

Flow Metering

For measuring rates of flow and total flows, the use of Venturi tubes with differential pressure manometer instruments has long been standard in water works. It is my belief that somebody is going to put on the market in the next few years a main line meter which will use neither a Venturi tube nor an orifice plate and will not use a mercury manometer instrument.

The principle of this new flow meter has already been proved and patents have been issued. The principle is the Doppler effect. You all know how the apparent pitch of a locomotive whistle is different when the locomotive is coming towards you and going away from you. This change of apparent pitch is directly related to wind velocity and locomotive speed. Exactly the same principle applies to the transmission of sound in water.

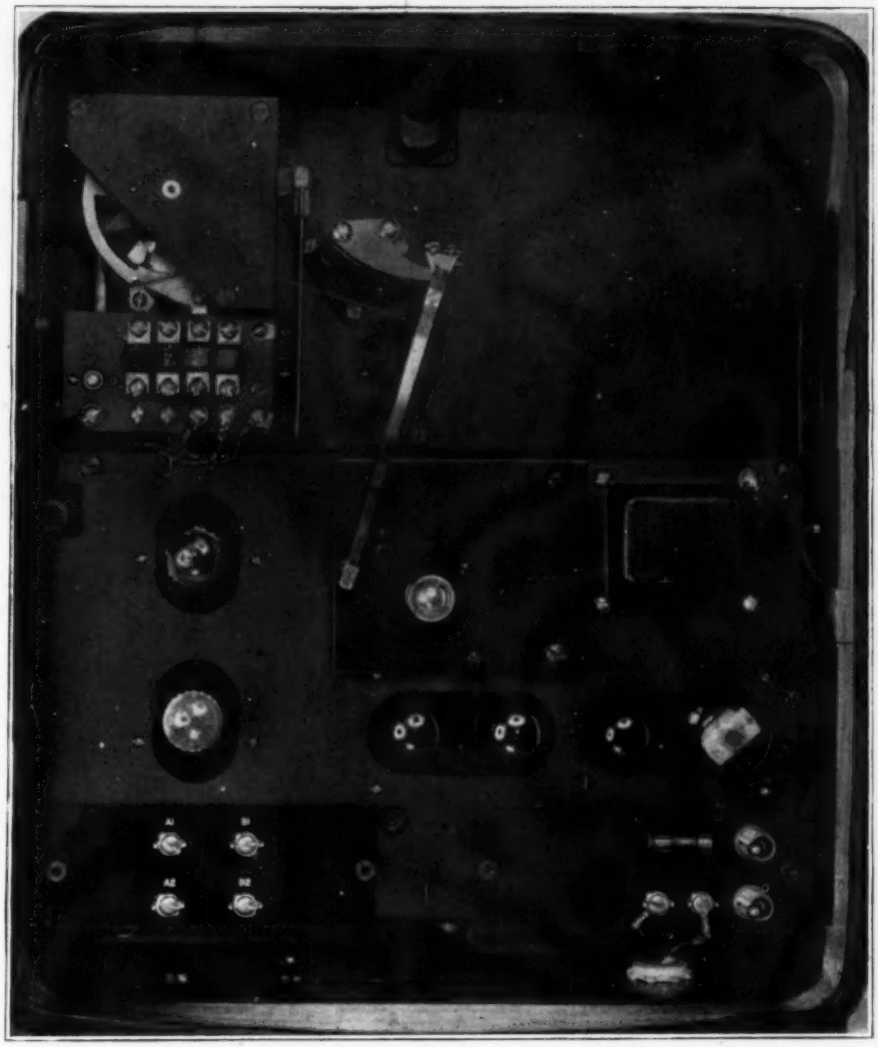
The tremendous development in underwater signalling and location equipment during the last few years has very probably worked out all the engineering problems, such as the electronic generation and transmission of pulses of sound waves, the detection of these pulses, and the conversion to flow velocity from apparent frequency shift.

Turbidimeters

Turbidimeters of various types have been described in the technical literature during the past few years. There are several commercial units using photo-electric cells now on the market. But their use seems to be developing rather slowly. Possibly the answer is a lack of general data on what the measurements with these instruments mean and just how they can be used in plant control.

Titrometers

For routine chemical laboratory analyses, titrometers using electronic voltage measuring circuits have been invented and reinvented in considerable numbers over the past five years. At present, each of the larger laboratory supply houses seems to have its own unit, which is distinctive in detail but similar in principle to the others.



Interior of Typical Modern Electronic Instrument
(Note simplicity and fewness of parts. Chart pen shows in center.)

Flocculation

I am personally highly optimistic about the use of electronic equipment directly in accelerating or modifying separation processes and chemical reactions. The influencing of these processes by direct application of electrical energy in the form of high frequency electric fields or spark discharges or in the form of high frequency sound waves is just now on the way from being a laboratory curiosity to becoming a laboratory success.

Of the three various possible methods mentioned above, the use of high frequency (or so-called supersonic) sound waves is promising for separation processes such as sedimentation or flocculation. The equipment used is a vacuum tube oscillator, which generates AC power at the desired frequency (commonly around 50,000 cycles per second). This power is fed to a converter unit, such as a piezo-electric crystal or a magnetically driven metal bar, either of which is immersed in a liquid. The crystal or bar vibrates at the frequency of the oscillator, and thus sets up compression waves in the liquid.

This action produces a number of effects in the liquid. In some cases it can produce emulsions of two liquids usually considered mutually immiscible. Some chemical reactions are accelerated.

The particular effect of interest to waterworks engineers is that of flocculation. In suspensions containing particles with specific gravities only slightly more than that of the liquid in which suspended and with a size above a certain minimum, flocs are formed as soon as the supersonic vibrations begin. With gas in the solution, the gas is forced into bubbles of increasing size and so expelled from the liquid. The suspended particles are driven to these bubbles by the pressure of the waves and so the particles are also expelled.

To me, there is in this supersonic equipment, the possibility of a radical change in filter plant methods and practice. It could mean either the total

elimination or else a great decrease in the size of sand filter beds used, and the use of small electronic flocculation units through which the raw water would flow at relatively high velocities.

Sterilization

Still another field in which the use of electronic equipment may become of major importance is that of sterilization of water.

One possibility is the use of special lamps to sterilize water by passing through it light rays in the ultra-violet zone, which directly kill many microorganisms. This technique is already being tried on a commercial scale in hospitals, medical supply plants, and food processing.

Still another possibility is the use of supersonic sound waves of the type previously described. In addition to the physical and chemical effects mentioned before, these waves also have a powerful disintegrating effect on microorganisms in the liquid where the waves are generated. This particular effect has probably had more study than any other possible application of supersonic energy. And as it is reported that some of the underwater detection equipment now in use is based on the use of supersonic frequencies, almost certainly there are new and powerful units ready for further development in this field.

Exterior of Electronic Instrument Illustrated

Pipe Location and Testing

A field of rather specialized interest to water supply operating men is that of underground pipe locating.

Before the war several pipe locaters based on well-known electronic principles were in use. The wide use of high frequency field electronic units to locate buried mines during the war makes it certain that further improvements in this equipment will be available soon after the war for locating water mains, valves, service lines and the like.

"Ingenieria Sanitaria"

(A Review)

"Ingenieria Sanitaria" (Sanitary Engineering)—By Professor Alfredo Mendiola, Lima, Peru, S.A.: Sanmarti & Co., 1944. 619 pages. (Price not given.)

This book is especially appropriate at this time on account of the increasing interest in sanitary engineering in Latin America. It is based on lectures by Prof. Mendiola, during the last 30 years, to civil engineering students in the Engineering School in Lima. In his preface the author emphasizes: 1) that the purpose of the lectures is to cover all the points of essential importance to civil engineers because students in sanitary engineering are given courses in this specialty; and 2) that the lectures consist of the most interesting material found in books and articles.

Up to 1940, 51 water works had been constructed in Peru to serve 1,046,000 people, about 15 per cent of the total population. The sources of the supplies are as follows: ground waters, 32; surface waters, 17; and a combination of both, 2. Eight of the supplies are filtered and 5 are chlorinated. The construction of 7 other supplies was started between 1940 and 1944.

The allowance per capita per day varies from 300 to 29 liters (79 to 8) gals.) with a variation of 150 to 250 liters (40 to 66 gals.) for the larger communities. 200 liters (53 gals.) are now generally used as the basis of design with 170 per cent of this volume for the maximum hourly consumption. Lima, with an approximate population of 520,000 including some bathing resorts, obtains about half of its supply from the Rimac river and the other half from infiltration galleries near the river. The river water is coagulated and settled and the combined waters are chlorinated. The total hardness of the combined waters is about 252 ppm.

The book contains 431 pages on water supply and 187 pages on sewerage with the result that the treatment of the latter subject is very condensed. The text is illustrated by 243 figures, of which a few are reproductions of photographs, and by examples of the use of several formulas.

The historical introduction is interesting. The best chapters in the section on water supply are those on: ground waters; the distribution system with 23 pages on the Hardy Cross method; and purification. The chapters on the planning of water supply and sewerage systems will be helpful to engineers of little sanitary engineering experience; and likewise the set of specifications for the sewerage system of Callao with ground water complications.

The following details are not covered by the text: the increasing use and advantages of ferric salts in the section on coagulants in which aluminum sulfate, ferrous sulfate with lime and chlorinated copperas are classed as those most used; surface wash for rapid sand filters; the conditions under which pressure filters may be used advantageously; the use of copper tubing for service connections to houses; and the improved types of joints for reinforced concrete pipe.

The 1925 standards of the U.S.N.A. Public Health Service are quoted instead of the current (1942) standards. The data relative to the number of water supplies in foreign countries require revision. There is a short discussion of the methods for avoiding "abusive consumptive" of water in which the author recommends the installation of meters.

Latin American Sanitation Developments

Ecuadorian Projects

Although systems for sewage disposal existed in Quito, Ecuador before the Servicio Cooperativo Inter-American de Salud Publica began its program in 1942, there were many additions and improvements needed.

Since April 1942, fifteen projects have been undertaken, ten of which were completed at the end of last year. The work has consisted principally of construction of collector and drainage canals, and installation of sewers throughout the city. Several outlying districts have been included in the sewerage system renovation.

The city of Loja, in the province of Loja, Ecuador, likewise has a new sewer and drainage system under construction. Fabrication of pipe began in Feb. 1944, and laying of the sewers is now in progress.

There is an unfortunate error on page 268. The purification plant for Barranquilla, Colombia, as finally constructed, was, it is believed, designed by Greeley & Hansen and DeBerard, and not by the reviewer as indicated by the text and accompanying figure.

A comprehensive index is lacking. The bibliography of 25 items could be enlarged to the advantage of the users of the book. The size of the printing is good but the binding is poor.

Considering the aim of the author this book is an important contribution to Sanitary Engineering in Latin America because it presents a large amount of general information and basic data in the Spanish language.

Geo. C. Bunker,
Caracas, Venezuela.

TEXAS' CAPITAL AREA WATER AND SANITATION ASSN.

Holds Well Attended Meeting in Austin

(A Report by Marvin Turner, Group Leader)

THE largest number of water and sewage men ever to attend a district meeting in Texas gathered in Austin on Thursday, July 26, to attend the all-day meeting of the Capital Area Water and Sanitation Association. Despite transportation difficulties, the registration soared to near the 250 mark, with approximately 150 of the number coming from within a 100-mile radius of Austin.

Technical sessions were held during the morning and afternoon and were very well attended at all times. July 26 proved to be the hottest day of the year thus far for Austin, but the air conditioned Capitol Ballroom of the Stephen F. Austin hotel proved a delightful meeting place in which to escape the mid-summer heat.

Lewis Nix of Gonzales, President of the Association, presided at the morning session and delivered the address of welcome to the members and to the visitors from the adjoining associations, of which there were a goodly number.

Mr. Egmont S. Smith, Neptune Meter Co., Dallas, Chairman of the Committee on Training of Meter Repair Personnel, Texas Sanitation and Research Foundation, gave a progress report on the Water Meter Repair Schools now being held throughout Texas and sponsored by the Texas Sanitation and Research Foundation. Mr. Smith reviewed the work of the schools in Dallas, Austin and Houston, explaining the work done and the great good which has been accomplished. Mr. Smith indicated that other schools soon would be held in Amarillo and Ft. Worth.

Sewerage Session

"Lines, Grades and Carrying Capacities of Sewers" was the subject of a very interesting paper by Mr. Hans R. F. Helland, Consulting Engineer, San Antonio. Mr. Helland's paper took up all phases of the design of sanitary sewers, citing many of his personal experiences in years of practice to illustrate his points.

Major R. M. Dixon, C. E., Utilities Branch, Eighth Service Command, Dallas, spoke on **"Solving Problems in Army Camp Sewage Treatment Plants"** and offered many helpful hints on what the operator might look for in solving these vexing problems.

Major Dixon especially emphasized the matter of attitude of the operators towards their work, stressing that this was one of the most important phases of the operation. Neatness and cleanliness was also the subject of quite a bit of comment from the former Dallas superintendent. To illustrate this phase of management Major Dixon showed color slides of the Camp Swift Sewage Treatment Plant at Bastrop, Texas, which was judged the best plant in the Eighth Service Command. Col. E. V. Spence, Post Engineer, Camp Swift, was commentator during the showing of the slides, paying many compliments to C. B. Coulter, civilian employee of the Post Engineer, for the condition of the plant.

A new speaker on water works programs in the Southwest appeared in the person of Mr. R. B. Suttle, Texas Management Counselors, Austin. Mr. Suttle spoke on **"Industrial vs. Municipal Personnel Administration,"** and pointed out that the problems of the municipality were just the same as those of industry and that it was going to be necessary for city officials to realize this and to meet their problems as industry is now doing or that they were going to be faced with many serious problems of this nature in the future.

Col. McNew Tells of Far East Experiences

The highlight of the morning program was the talk by Col. J. T. L. McNew, Vice President for Engineering, Texas A. & M. College, College Station, Texas. Col. McNew devoted his time to **"Sanitation, Its Lack and Implications in the Far East."** Col. McNew related his experiences in China

Host & Group Leader

Albert E. Davis
Superintendent
Austin Water Dept.

Marvin Turner
Engineer

P. M. Presider

Julian Montgomery
Consulting Engr.
Austin

Programmers

Maj. R. M. Dixon
U. S. Engrs.
Dallas

A. S. Hatch
Supt. of Water
Houston

Beauty at the Barbecue
(And What Else?)

and India during a recent tour of duty with the United States Army. Col. McNew dwelled especially on the water supply and disposal systems available in the Far East, taking each country up separately and paying tribute to them for the manner in which they have met their problems with limited means.

Symposium on Wells

The afternoon session, presided over by Julian Montgomery, Consulting Engineer, Austin, presented a Symposium and Round Table Discussion on Water Wells.

Mr. W. O. George, Associate Geologist, U.S.G.S., Austin, read a paper on **"Geology of Underground Water Supply in Central Texas"** to open the afternoon session. This was followed by papers on the **"Sanitary Construction and Protection of Wells,"** N. E. Davis, District Engineer, State Health Department, San Antonio, and **"Testing of Wells for Capacity and Drawdown,"** by Mr. R. W. Sundstrum, Assoc. Engineer, U.S.G.S., Austin.

Marvin C. Nichols, Freese and Nichols, Consulting Engineers, Fort Worth, led an interesting discussion on **"An Engineer's View of Well-Drilling Contracts."** Mr. A. S. Hatch, Supt. Water Department, Houston, followed with a paper on the **"Relationship Between the Well-Drilling Contractor and the Owner."**

The closing subject on the program took the form of a discussion between two men on **"Experiences in Restoring Well Capacities."** Mr. E. A. Vaubel, Chief Engineer, Layne Texas Company, Houston, took the part of the owner in this discussion, and Mr. Sam Olson, President and Manager, Layne-Texas Company, Houston, played the part of the well driller. The question and answer discussion between these two men, their many remarks, and the manner in which they brought out the problems confronting the well operators easily was the feature of the afternoon program.

Mr. Julian Montgomery, presiding, kept the program moving at a rapid pace, and added many interesting remarks and questions to the program.

Old-Fashioned Barbecue

Following the business meeting the members and guests were served an old-fashioned ranch barbecue at Barton Springs, a feast for which the Capital Area and Austin are becoming famous throughout Texas. This was followed by dancing in the pavilion and an all-colored floor show from the Rosewood community center.

All left Austin feeling that they had received enlightenment for the mind and nourishment for the body and soul.

Acknowledgment

For this report we are indebted to Marvin Turner, Group Leader of the Capital Area Ass'n. and Vice Chairman of the Southwest Section of A.W.W.A. For the snapshots of the ladies taken at the barbecue we are indebted to "Bill" Pebworth of Dallas. It is regrettable that our files failed to contain a picture of the Capital Area Association's "prexy," Lewis Nix, Manager of Public Utilities, Gonzales, Tex. For not getting a picture of the president, a reprimand for Photographer Pebworth.

Gordon Wiest Heads Albright & Friel's Laboratory

Gordon J. Wiest, earlier connected with Albright & Friel, Consulting Engineers of 1520 Locust St., Philadelphia, has returned to this firm as Chemist in Charge of Laboratories.

Gordon J. Wiest, M.A.

In the announcement of the appointment of Mr. Wiest to this position, Albright & Friel state that their laboratory service will include chemical, biological and bacteriological analyses of water, sewage and industrial wastes. In addition, Mr. Wiest will be available to municipalities and industry for supervisory and consulting service in connection with plant operation as well as plant improvements and design—also, for conducting stream surveys and making special studies of pollution effects.

Mr. Wiest, a native of York, Pa., with a twelve year background of experience in plant operation, holds a Master's degree from Franklin & Marshall College. He has also pursued graduate work at the University of Michigan and Johns Hopkins University. He served as Chemist in Charge of the sewage treatment plants of Lancaster and Chester, Pa., and was employed by the Brewster Aeronautical Corp. to take charge of its sewage treatment plant and to develop a method of purification of its industrial wastes, which he successfully did, and thereafter assisted Albright & Friel in the design of the waste treatment plant. For a period he became associated with that firm before joining the Technical Service Dept. of Penna. Salt Co., which position he leaves to accept the appointment with Albright & Friel, who are now in position to offer a complete laboratory service and plant operation supervision and advisory services in stream pollution problems in general.

Gary Gas Engines Continue to Earn Money

For the fourth year since the operation of the Gary, Indiana, Sewage Treatment Works was begun, the total value of the sludge gas utilized for power and heating was over $20,000 and reached a high of $22,661.08. According to the annual report for 1944 on this treatment works, prepared by W. W. Mathews, Superintendent, this value of the sludge gas which has averaged $21,754 per year is equivalent to 1½ cents on the Gary tax rate.

In terms of dollars, the value of power requirements satisfied through the use of sludge gas is approximately two-thirds of the total. In terms of average load, approximately 80 per cent of the total is supplied through the use of sludge gas.

Mr. Matthews' report indicates that with a decrease in precipitation the volume of sewage handled was somewhat less than in the previous years, as was the amount of suspended solids removed but the five day B. O. D. removed was higher than during previous operations. Average overall results indicate a reduction in suspended solids of 98.4 per cent and a reduction in five day B.O.D. of 96.4 per cent. The cost of operation per capita was up from $0.6827 to $0.8023 per year but no explanation is given.

Air dried sludge was again available and although that removed was higher than in 1943 it was still less than the high of 1942, probably due to continued gasoline rationing. At the end of 1944 there had been 10,289 persons registered in the sludge taker's book. Of these, 2,167 removed 3,502 cu. yd. of sludge from the drying beds in 1944, while 2,656 persons removed 3,330 cu. yd. in 1943 and 4,039 persons removed 5,130 cu. yd. in 1942.

Water Co. Receives Nat'l Security Award

While the manufacturing industry has received its just recognition for its war efforts, through the Army-Navy "E" Awards, the efforts of the water works industry have quite generally been accepted with hardly a murmur of praise.

It is a pleasure, therefore, to learn that the National Security Award has recently been awarded to the Western New York Water Co. in Buffalo, N. Y. In presenting the award to Hugh Dewey, president of the company, Col. Allan Reif commented on the excellent service rendered by the company, thereby making possible the maintenance of high production rates by the war industries which the water company served.

DIRECT READING ARSENITE-ORTHOTOLIDINE TEST

In Which Interference Readings May Also Be Utilized

By A. A. HIRSCH*
State Department of Education
BATON ROUGE, LA.

IT is well known that the orthotolidine test for residual chlorine is subject to false coloration and consequent error in the presence of nitrites, and oxidized manganese. These effects can be avoided, however, by auxiliary use of sodium arsenite solution, according to a method developed by Hallinan[1].

The Author

Sodium arsenite, introduced before the orthotolidine reagent, prevents color formation by chlorine and chloramines, but does not inhibit false colors caused by interfering substances. Therefore, by noting the magnitude of the interference, or by an equivalent arrangement of the liquid cells in a comparator, a suitable correction can be applied in order to obtain the true residual representing chlorine and chloramines together.

When the sodium arsenite solution is added immediately following the flash color produced by free chlorine with orthotolidine, the slowly developing color representing chloramine residual is blocked. Evaluation of chloramines may then be made substracting the value of free chlorine, i.e. the "flash" value, from the five minute reading taken with orthotolidine in the usual way.

In a variation of this test proposed by Griffin[2] the corresponding false color in an arsenited orthotolidine mixture is subtracted from the flash and the five minute readings of a conventional orthotolidine test to determine the free chlorine and the total chlorine, respectively. This paper presents[1] a slightly modified reagent[3], a simplification of procedure to enable a full set of observations from a single comparator set-up, and[2] demonstrates certain by-product values that the interference, itself, yields.

Sodium Arsenite Reagent Characteristics

In previous directions[1] a 0.5 per cent solution of sodium arsenite in distilled water is specified for use in the proportion of 0.75 ml. of solution per 15 ml. sample cell volume. Due to alkaline hydrolysis such a solution has a pH value exceeding 10.0, in which condition, according to Kolthoff and Sandell[3], the arsenite is slowly oxidized to arsenate by contact with air, thereby reducing its strength some slight amount. Also, since orthotolidine is primarily an oxidation-reduction indicator, the presence of arsenate might be expected to cause false coloration by the very reagent which is expected to permit correction for interferences.

In order to test this possibility a 0.5 per cent solution of sodium arsenite in distilled water was aerated, and tested with orthotolidine at intervals. At the end of two hours aeration, the orthotolidine test produced a slowly forming color, equivalent to about 0.02 ppm. chlorine on 10-minutes standing, and 0.06 ppm. as chlorine in half an hour. A four day old solution of sodium arsenite also gave a small false residual. Strangely, this effect is not due to the formation of sodium arsenate because a 0.5 per cent sodium arsenate ($Na_2HAsO_4.7H_2O$) solution did not form a color with orthotolidine reagent.

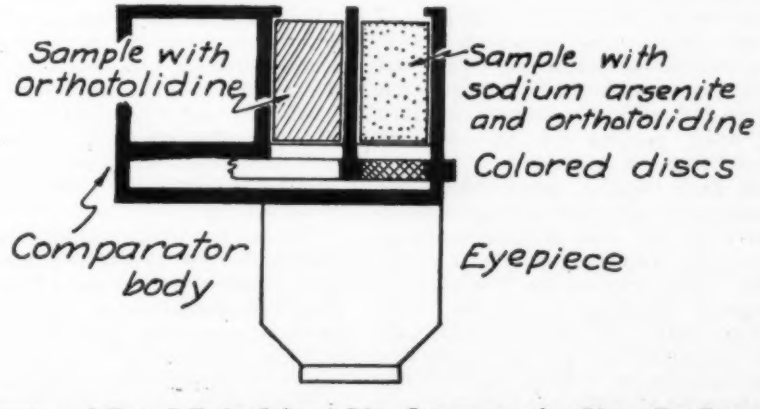
From these observations, no explanation for the mechanism of threshold interference through the sodium arsenite itself is ventured, except to note its occurrence as a fact.

Preparation of Sodium Arsenite Reagent

In order to prevent the oxidation of sodium arsenite on long standing, the solution should be neutralized or slightly acidified[3]. After this precaution was taken, experimental aeration of the solution did not cause a false color to form when tested with orthotolidine.

Additional advantages of a slightly acidified solution are the prevention of a silicious precipitate from the glass container and the maintenance of a full acid reserve of the orthotolidine reagent to stabilize the pH value of the reaction mixture for optimum color characteristics. In a test on tap water (alkalinity 140 ppm. pH 7.8) neutralized sodium arsenite solution permitted a slightly faster rate of color develop-

Reading time	Color Representations		Interpretation of disc reading
Immediate	Free chlorine Rapid Interferences	Rapid Interferences	Free chlorine
5 minutes	Free chlorine Chloramines Interferences	Interferences	Free chlorine and chloramines



Arrangement of Test Cells in Colored Disc Comparator for Direct Readings with Sodium Arsenite-Orthotoldine for True Chlorine and Chlorine Compound Residuals

*Director, Sectional School on Water Supply and Sewage Treatment.

ment from interference than did alkaline sodium arsenite solution.

A doubling of the sodium arsenite concentration is advisable to minimize dilution errors when using arsenited samples as a blank. In a 15 ml. comparator cell, the error caused by 0.75 ml. of arsenite solution, as previously recommended[1], is 5 per cent, which figure may limit accuracy of readings in the range of good color discrimination.

To prepare the sodium arsenite reagent, dissolve 10 g. of sodium metarsenite ($NaAsO_2$ mol. wt. 129.93) in 900 ml. of distilled water; neutralize with hydrochloric acid to the methyl orange end point, using the indicator externally on a drop plate, and dilute to a liter with distilled water.

Simplified Procedure for Comparator Test

This technique is based on the repression of color by sodium arsenite, except for the interferences, and the differential development of free chlorine and chloramine residuals. Directions are stated for a popular comparator which holds a 15 ml. sample volume, but the proportions apply, in proportion, for other instruments.

Referring to the accompanying figure: In the left hand cell, place the regular orthotolidine test mixture, consisting of 15 ml. of water sample and 1 dropperful (approximately 0.75 ml.) of orthotolidine reagent[4]. Instead of untreated water in the compensation cell to the right, in line of sight with the graded series of colored discs, place the inhibited mixture consisting of 15 ml. of water well mixed with one-half dropperful (approximately 0.38 ml.) of sodium arsenite solution; next add 1-dropperful of orthotolidine. This cell is best prepared first so that attention is freed for quick introduction, mixture and flash reading of the straight orthotolidine cell at the left.

The flash reading, taken within ten seconds, gives the free chlorine concentration directly, with instrumental correction, for rapidly forming interferences. After waiting for five minutes, a similar reading shows the total chlorine, both free and combined, likewise corrected for corresponding delayed false colors. Chloramine chlorine is calculated by difference between total chlorine and free chlorine.

To evaluate the interferences the arsenited mixture is moved into the comparator space to the left, and matched with the discs. Ordinarily, for this part of the procedure an untreated sample in the right hand position is unnecessary, unless the specimen is turbid or has natural color.

For assurance of full color development in all cells, the temperature of the samples should not be lower than 70°F. Free chlorine residuals flash color as low as 40°F., but if the water is chilled near the freezing point, this reaction also is retarded.

An analagous arrangement may be set up in the solution-standard-rack type of comparator by replacing the blanks for untreated water sample with arsenited-orthotolidine mixtures.

Applications

The direct reading arsenite-orthotolidine test appears to have a number of applications. The following discussion sets forth several situations in which this test does now or may find applications.

As previously indicated, the sodium arsenite protected orthotolidine test is useful and sometimes indispensable, whenever significant amounts of manganese, iron or nitrites are present in the sample.

In well water supplies, high in iron or manganese, the indicated residual by the conventional orthotolidine method is always erroneously high in samples taken close to the point of chlorination. Further out in the system, after these minerals have precipitated, the interference disappears.

In iron removal plants in which chlorine is used as the oxidant, the residual reading in the early stages of coagulation is too high due to interference of ferric iron still trailing in solution. This reading is important, since the control of chlorination is frequently based on it. Manganese behaves similarly.

Nitrites are likely to interfere in the chlorination of remotely polluted surface supplies, and in the effluent from filter beds containing certain nitrifying bacteria, especially when the raw water is high in ammonia or is given chloramine treatment prior to filtration.

Paramount interest lies in the control of chlorination in sewage treatment plant effluents from activated sludge or trickling filter units. Here the nitrites are sufficiently high to form a completely deceptive color following a low marginal chlorination, as frequently used. This *exact color* may also form with the *unchlorinated* final settling tank effluent. A real chlorine color is obtained only when the dose is boosted sufficiently, and controlled by the arsenite-orthotolidine method.

The close agreement between simple orthotolidine coloration in unchlorinated effluent and the arsenite-orthotolidine color in the same liquor following light chlorination constitutes assuring proof of the validity and the value of the arsenited test. Without correction for interference, the orthotolidine test for control of chlorination of sewage treatment effluents and nitrogenous trade wastes may be utterly worthless. A partial tabulation of results obtained in a study at the Lake Charles, La., sewage treatment plant, of interest in this connection, is given in Table I.

TABLE I

Partial results of arsenite-orthotolidine tests at Lake Charles, La., activated sludge plant to show effect of nitrites.

Liquor	Corrected Chlorine Residuals ppm.		Interferences ppm.	
	Flash	Five Min.	Immediate	Five Min.
Final settling tank effluent (before chlorination)	0	0	0.06	0.11
Plant effluent after chlorination—				
As formerly controlled with orthotolidine test	0	0	0.07	0.12
After raising chlorine dosage	0.04	0.07	0.08	0.11

Utilizing the False Residual Values

While interferences are detrimental to the accuracy of the uncorrected orthotolidine test, they still are useful as rough or crude measures of the causative substances. Interferences may be measured in the arsenite-treated sample followed by orthotolidine, as described in the procedure.

In iron removal plants, the presence of unstable ferric ions is demonstrable only near the inlet of the settling basins; this fact may be taken as evidence of efficient oxidation. Persistent false color through an otherwise satisfactory plant may point to the concurrent presence of manganese slowly oxidizing at sub-optimum pH values. Disappearance of interferences in the distribution system is associated with deposits of iron or manganese in the mains. Table II shows such a succession of values obtained at the Lake Charles water treatment plant and distribution system.

Nitrite interferences are highly useful in following the degree of oxidation through the course of secondary treatment units and in the quick evaluation of effluents. An appreciable interference is expected in a well functioning disposal plant employing secondary treatment. Preliminary tests at the Lake Charles activated sludge plant seemed to enable correlation between satisfactory operation and the strength of the false residual.

Summary

This paper proposes that sodium arsenite solution be mildly acidified: (1) to prevent a possible trace of false residual due to unexplained oxidation, (2) to avoid silicious deposits from common glass bottles, and (3) to maintain the original acid reserve in the orthotolidine reagent to buffer the color reaction. It is proposed that the concen-

tration of sodium arsenite be doubled to reduce the dilution error to a negligible amount.

It is also proposed that the sodium arsenite-orthotolidine test be used instrumentally to yield direct readings for free chlorine, total chlorine (both free and combined), and interferences in a single set of determinations.

It is also believed that interferences may be serviceable in themselves as a by-product of the test; the iron and manganese error may be used to observe their removal in a treatment plant, and the nitrite error may be used in evaluating quality of sewage plant effluents.

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TABLE II

Arsenite-orthotolidine tests at Lake Charles, La., water treatment plant to show effects of iron removal and subsequent ammoniation.

Sample	Corrected Chlorine Residuals		Interferences	
	Flash	Five Min.	Flash	Five Min.
	ppm.	ppm.	ppm.	ppm.
Mixed wells	0	0	0	0
Fe 2.8				
Mn 0.45				
Alkalinity 138				
CO_2 28				
pH 6.9				
Settling basin influent (after chlorination 4 ppm. and aeration)	0.90	0.90	0.06	0.13
Settling basin effluent	0.80	0.80	0.11	0.14
Filter influent (after 0.7 ppm. ammonia added)	0.40	0.80	0.11	0.13
Filter effluent	0.32	0.70	0.06	0.07
ppm.				
Clear well	0.30	0.70	0.03	0.04
Fe 0.15				
Mn 0.07				
Alkalinity 130				
pH 8.0				
Distribution System—				
Eastward—				
¼ mile	0.27	0.80	0.03	0.03
¾ mile	0.07	0.10	trace	trace
1¼ mile	trace	0.03	0	0
Southward—				
½ mile	0.25	0.60	0.01	0.02
1 mile	0.17	0.42	0.02	0.02
1¼ mile	0.06	0.16	0	0
1½ mile	0	0	trace	trace

Hunter Becomes Asst. City Manager of Dallas

Homer A. Hunter, superintendent of Water Works of Dallas, Texas, and the man who developed a noteworthy master post-war expansion plan for the Dallas water works, is going to have a chance to supervise its fulfillment. Mr. Hunter has been appointed as acting assistant city manager of Dallas to increase the efficiency of the municipal administrative work.

Homer A. Hunter

In his new capacity, Mr. Hunter will retain general supervision over the water works, but H. K. Hoefle, former engineer of construction and maintenance for the water works, will become acting superintendent. Homer Hunter has been an employee of Dallas since 1940 when he was named assistant to the Director of Public Works.

News Letter Editor Changes

The August issue of the *Mich. Water Works News*, issued by the Mich. Dept. of Health, contains a new editor's name on the Masthead. Raymond J. Faust became Secy.-Treas.—and Editor—of the Mich. Sect. AWWA when Maurice J. (Morry) Gerady died last June.

Another new editor is Jerome H. (Jerry) Svore, who took over the North Dakota *Official Bulletin*, when Ken Lauster resigned as Act. Dir. of the N. Dak. Div. of San. Engineering, to enter the U. S. Public Health Service.

Sixth Annual Water Conference to Be Held in Pittsburgh

Many Leading Authorities on Engrs. Soc. Program.

From H. M. Olson, Chairman of the Annual Water Conference of the Engrs. Soc. of Western Penna., has come assurance that the 6th of these annual conferences is positively to be held at the Hotel Wm. Penn, Pittsburgh, Pa., on Monday, Oct. 22, and Tuesday, Oct. 23.

Examination of the program reveals the usual interesting variety of topics which are of high importance to all connected with industrial process water supply and boiler water production. However, amongst the papers scheduled are several of interest also to water supply men in general—notably those on Oct. 22nd, dealing with water treatment to minimize corrosion, and those on Oct. 23rd presenting the latest in water softening processes. In these categories are found such papers as that on "Vacuum Deaeration of Cold Water" by Sheppard T. Powell of Baltimore; "How to Evaluate Corrosion Data," by V. V. Kendall, National Tube Co.'s Corrosion Engineer; "Electrolytic Water Softening," by R. E. Briggs, of the Metropolitan Water Distr. of Southern California; "Ionic Exchange Softening—Materials and Methods," by F. K. Lindsay, Nat'l Aluminate Corp.

In addition, water supply men in general will be attracted by the paper of N. E. Gunderson on "The Construction and Maintenance of Water Wells" and that on experiences with "Diatomacious Earth Filtration," by Hollberg and Armburst of Proportioneers, Inc., of Providence, R. I.

Amplifying the principal papers, a number of 5-minute discussions of each by speakers well qualified to discuss the topic have been arranged. Anyone interested may obtain a complete copy of the program by writing H. M. Olson, Engrs. Soc. of Western Penna., Hotel Wm. Penn, Pittsburgh, Pa.

Littlefield Succeeds Clark as Supt. at Sanford, Me.

Succeeding Horace L. Clark as Supt. & Gen'l Mgr. of the Water District of Sanford, Me., Emery L. Littlefield has been appointed Supt. and Gen'l Mgr.

Mr. Clark resigned August 1st to accept the position of General Manager of York Utilities Co. of Sanford, Me., a company in the transportation business. We regret that the water works field has, thereby, lost a worthy engineer and a past president of the New England Water Works Assoc.

E. L. Littlefield

Mr. Littlefield, only 30 years old, has been serving as Ass't Town Engineer of Sanford. He is a graduate of the Univ. of Maine (1935), beginning his career as assistant engineer in the State Highway Dept. of Maine.

CHINA REPORT—BY MORRILL

(Interesting Excerpts from a Letter to "Doc" Symons, Assoc. Editor)

DEAR Doc:—After leaving Ethiopia I stayed a week or two in India. Went to Afghanistan for three weeks (and stayed seven) and after another ten days in India arrived in China. I was almost without mail for two months and have been busy ever since answering the stack of letters and things that had accumulated here.

Colonel Arthur Morrill Chunking

I drafted this letter, the typewriter not being handy, on the backs of your "Here and There" for October and December. In spite of the rare quality of "Here and There" it doesn't seem right, in wartime China, to have it come out on Myriad Chemco All-Rag Bond. Next time send me the four blank sheets of all-rag and put my "Here and There" on sulphite. (Ed. note: Doc sends Col. Morrill carbon copies of his typescripts of the column.)

About the Dragon-Bone Wheel

Besides some more useful things, I have been trying to determine the pumping capacity of a "lung-ku-ch'ê", which means a "dragon-bone wheel". It is a remarkable gadget used in this part of China to pump water from one rice-field terrace to the one above. There is an inclined wooden flume in which a series of paddles perhaps six inches square move up a slope of about 3 to 1. The paddles are strung on a wooden chain which goes over a big sprocket wheel at the upper end. Two men sit on high seats above the wheel and turn the shaft with their feet by means of pedals on long arms. Our best guess is that they can lift about 180 gpm. five feet when they are working, but the work is hard enough so that they have to rest about half of the time. If these are good guesses you will see that the continuous output of a Chinese peasant during working hours is 0.057 horse-power. The machine looks very efficient. Even the pins of the chain are made of wood or bamboo.

Since power pumps and motor fuel are very hard to get here, we have considered using these lung-ku-ch'ês for small institutional water supplies. We actually did use one for pumping out a test well we were digging to find a water supply for a town of 10,000 people. That was in the next county to Chungking and there they turn the machines by hand instead of using their feet. The local Chinese engineer rounded it up somewhere; I suppose he rented it from some peasants and got the owners to come along to crank it. For higher lifts they sometimes use two or three of the gadgets in series, the lower discharging into a little earth basin from which the upper takes its water.

I never happened to see the backbone of a Chinese dragon, but when the paddle chains are going they look exactly as the dragon backbone ought to look, whence the name. Most of the unpoetic local peasants call them a "water wheel" but my Chinese sanitary engineer says they are "dragon-bone wheels" in his part of the country and I like that name much better.

Chungking Sewers

Chungking is a very picturesque place, albeit decidedly smelly in spots. I have wandered along some of the creek-beds that serve as open sewers and they are in a class with Chicago's smelly Bubbly Creek in its best days. The slopes are generally very steep, however, so the velocities will always be high enough if we can get some good sewers built. This situation is all in the "new city", which has sprung up since the war. The old city is already well supplied with sewers.

Unless we provide a lot of expensive drop manholes the velocities in our sewers will be much higher than are generally allowed in the U. S. One of the problems is to find out how many meters per second the local stone sewers can stand. There is no siliceous gravel to get washed into the sewers so perhaps higher velocities will do no harm.

Ancient City Wall

The population of Chungking has doubled since the war and a whole new city has grown up outside the ancient city wall. A good deal of the wall has been removed at one point, where the main street cuts across it and apparently follows the line of the old wall for several hundred feet. The wall was well built with stone facing and was very formidable, as it was often right at the top of a very steep slope a hundred or two hundred feet high.

The old city included the part inside the wall with narrow strips between the walls and the banks of the two great rivers that meet at Chungking. The sewers there are rectangular, built of stone, apparently a long time ago. There is usually one on each side of the street, about under the road curb, if there is a curb. Not much of the excreta is discharged into the sewers. Much of it is collected from public latrines and carried away for use as fertilizer. Waste water from cooking and washing clothes is often dumped into inlets along the streets from which it flows to the sewers.

In the new city, because of the rapid growth, conditions are not so good and sewer construction is badly needed. Even in the old city the record of existing sewers is very inadequate and one of our first big jobs is to find where the present sewers are, their size, depth, slope, etc.

* * *

P. S.: If, during your conventioneering life-of-Riley you run into any of my friends, tell them that I am feeling fine and having a very interesting time, but when the fireworks are over it will also be very pleasant to come back to America, where you can eat lettuce and drink milk in restaurants and where the 220-volt circuits never drop to 165.—A. M.

Proceedings of the West. Penna. Water Conf. Available

As if to remind us that the 6th Annual Water Conference of the Engineers' Society of Western Pennsylvania will be held on Oct. 22-23, in Pittsburgh, the Proceedings of the 5th Annual Conference arrived within the month.

This is the fourth of the Proceedings to be printed and this edition is better, if possible, than the previous ones. H. M. Olson, as Chairman of the Conference, has done a good job in editing the collection of papers and this edition is another worthwhile addition to the literature of water treatment.

Subjects covered include demineralizing water; removal of ammonia from condenser water by chlorination; recirculating cooling water; cathodic protection of steel surfaces in water; treating water for steel, paper, and rubber industries; treating pickle liquor wastes; ozone as a sterilizer; and silicates as coagulation aid.

Eleven papers are included in the collection, with the prepared discussions of each as well as the discussions from the floor. Issued in a paper bound book of 192 pages, printed on good stock, these Proceedings were mailed to all persons who registered at the 1944 meeting. A limited number of copies are available at $3.50 each from the headquarters of the Engineers' Society of Western Penna., care William Penn Hotel, Pittsburgh, Pa.

NEW 100-TON INCINERATOR OF TOWN OF TONAWANDA, N. Y.

A Wartime Installation Requiring Minimum of Critical Materials.

By ALEXANDER MARTIN, Chairman
Municipal Improvement Committee
TOWN OF TONAWANDA, N. Y.

and

NEWELL L. NUSSBAUMER
Nussbaumer & Clarke
CONSULTING ENGINEERS
BUFFALO, N. Y.

THE TOWN of Tonawanda, N. Y., located north of the City of Buffalo, along the Niagara River, is one of the principal suburban areas for the City of Buffalo. The Town includes the Village of Kenmore, many industries and supporting population. The Town has two sewage plants and a garbage incinerator administered by the Municipal Improvement Committee of the Town Board. All wastes of the Town including those of the Village of Kenmore are disposed of at these plants.

The reason for the growth of the Town is obvious when one considers that Buffalo has only 42 square miles of area, which for a large manufacturing, railroad, and harbor center of over 500,000 population, is small, and consequently well built up. This fact has caused much of the recent industrial and domestic growth in the area beyond Buffalo's city limits. A large proportion of this industry has located to the north with a corresponding increase in supporting population. Table 1 shows the relative population growths between the city and the suburban area.

First Garbage Incinerators

This disparity of growth shows the need for sewage and garbage disposal facilities in the Town of Tonawanda. A garbage incinerator was planned for the Town of Tonawanda in 1926. The plans called for a building and chimney large enough to serve two 40-ton incinerator units. The plant was built in 1927, but only one furnace was installed. This was at a time when the Town population was a little more than 10,000 persons, but was growing very rapidly. In 1928 the second unit was installed, making a total of 80 tons capacity in 24 hours.

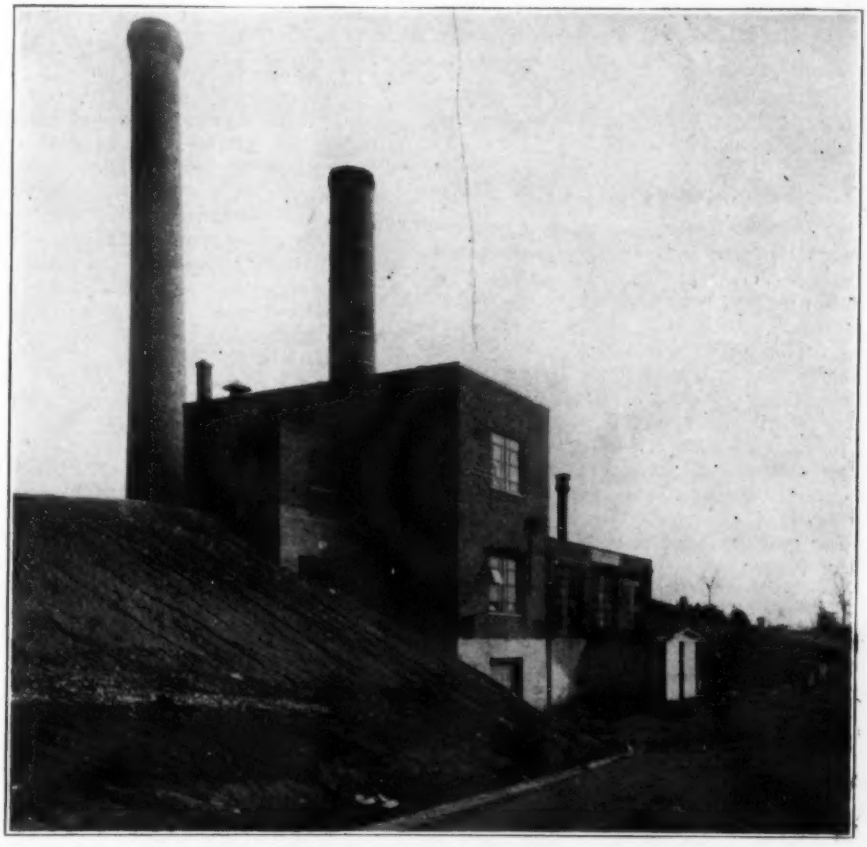
These furnaces were of the mutual assistance type, with drying and burning hearths, manufactured by the Pittsburgh-Des Moines Steel Co. They served very well until the middle 1930's when some repairs were necessary, at which time the Town redesigned the furnaces, making the total furnace projected area a burning hearth, instead of a combined burning and drying hearth, with the hope that this would increase the furnace capacity.

The general operation of the plant required five men: a working foreman and four men, two of whom generally stoked, while two worked on the charging floor. The foreman filled in to the best advantage where extra help was needed.

The Authors

In 1940, more extensive repairs were needed on the chimney, and one furnace was badly in need of relining. The Town Board decided to prepare plans for a new incinerator building, rather than make the repairs, as it was not thought possible to shut down one furnace and still maintain service. There was a chance then of receiving FWA aid in financing. A combination of circumstances, involving the FWA, the U. S. Public Health Service, the WPB, and other public agencies, delayed action until the most critical building period during the war arrived in 1942, when it was impossible to secure permission to proceed with any municipal construction.

Finally, after submitting a variety of layouts, permission was given by the WPB to construct a 100-ton garbage and refuse incinerator of the Nichols Mono-hearth Type, adjacent to the present building, because this type of incinerator used a minimum of critical materials. Bids were taken on Jan. 31, 1944. The construction was completed, and the furnace was placed in opera-



Incinerator Buildings of Town of Tonawanda, N. Y.
(*Old building in rear; sewage treatment plant is to right—out of picture*).

tion for drying out and testing purposes late in October, 1944. The unit has been in daily use since the middle of November, 1944.

The general contractors were the Shirley-Herman Co., Inc., of Buffalo, and the contractors for the incineration equipment were the Nichols Engineering & Research Corporation of New York City. The chimney was constructed by the International Chimney Co. The construction cost of $105,000 included the structure in which the new equipment is housed, and the remodeling of the old structure above the tipping floor.

Charging Floor of Incinerator Building
(The very effective Bulldozer at work)

The New Incinerator

The installation includes a three-story building in which the incinerator unit with all auxiliaries is housed, a new stack 110 ft. high above the foundations, the moving of the truck scale to a position adjacent to the new building at the charging floor level, an office, locker room, and direct ash dumping facilities. Changes were made to the tipping floor of the existing building so that trucks could drive through both buildings at the same floor level. Provision was made for extending the charging floor over both buildings in the future.

The charging floor in the new building is 25 ft. x 45 ft., a total of 1,125 sq. ft., out of which it is necessary to deduct the stairwell and the fuel storage bin, giving a net useable area of about 1,000 sq. ft. This area is somewhat small, but the condition will be greatly improved when it is possible to extend the charging floor over the old building, thereby making a total of 2,750 sq. ft. of useable charging floor area.

The present condition is alleviated to a certain extent by using part of the present 15 ft. driveway through the old building for storage. When deliveries now are bunched to the point that the material cannot be stored on the charging floor in the new building, then certain loads are dumped into one of the old incinerators, where they are burned. A tin can chute is provided at this floor, so that if the operators desire to pick out tin cans and glass material instead of running them through the furnace, this can be done.

Auxiliaries

Access to this floor level, which is about 20 ft. above the general ground level, is attained by earth ramps. The truck scale is placed at the entrance to the charging floor, with the weighing beam inside the building in an office wing. All truck doors are motor driven. A vertical clearance of 15 ft. 6 in. is provided under the roof projections. By way of contrast, the clearance in the original building was 11 ft.

On the stoking floor are provided door openings to the furnace, peek holes in the combustion chamber for observation, the operating winch to move the damper in the main flue to the chimney, the heating boilers, forced draft fan, drive mechanism for the mechanical stoker, control panel, ventilating system, and the locker room facilities for the operators.

A waste heat boiler is provided to heat the locker room, office, and charging floor at times when the incinerator is in operation. A standby gas boiler heats all but the charging floor, and is used generally over week-ends. The heat supplied to the charging floor is through two unit heaters, which provide enough heat to thaw out frozen material if allowed to stand, and prevents freezing of material stored on the floor.

A control panel, opposite the furnace, contains the controls for all motor driven equipment, and the pyrometer indicator. The recording pyrometer is located in the office off the charging floor.

The locker room, which is greatly appreciated by the men, includes a room for resting, and eating lunch; and a separate room in which are located a shower, toilet, wash basin, and individual lockers.

At the ground floor level, access is given to the ash tunnel, where there is a refractory lined ash hopper below the burning hearth, equipped with quenchers and a chain operated gate with drain. Ashes accumulated in the hopper can be dumped directly into a truck. A ventilating system exhausts air from the ash tunnel when ashes are dumped.

An operating convenience is a speaking tube, which permits calling from floor to floor to give orders and information, thus saving many steps.

Details of the Furnace

In the flue of the chimney, a refractory baffle has been placed to break up any burning papers or other material which may have passed through the combustion chamber and which would cause a nuisance by passing out the chimney. Such conditions would be expected to occur only when the furnace is working at peak capacity with the forced draft fan in operation. Operating experience has shown that a variable-speed motor as originally planned for the forced draft should replace the temporary constant-speed motor as soon as one can be secured.

For removing fly ash from the base of the chimney, it was originally proposed to install a stiff leg hoist. Little fly ash has been experienced and since some grading changes are desired, this feature, for the time being, was omitted.

TABLE I

Comparison of Growth in Buffalo and the Town of Tonawanda

	Buffalo		Town of Tonawanda — Village of Kenmore			
Year	Population	% Increase 5 Years	Population	% Increase 5 Years	Total Population	% Inc. 5 Years
1905.....	376,587	...	506	....	1,511	....
1910.....	423,715	12.5	1,020	101.	2,175	49.1
1915.....	454,630	7.1	1,700	66.6	3,062	41.
1920.....	506,775	19.6	3,160	86.	5,505	80.
1925.....	538,016	6.1	6,521	106.	10,539	91.
1930.....	573,076	6.5	16,482	15.2	25,006	137.
1940.....	575,901	0.25	18,612	6.5	32,155	14.3
1945.....	605,000	5.0	20,200	8.5	40,000	24.5

The furnace is a vertical, cylindrical unit, 12 ft. outside diameter, with walls composed of 9 inches of firebrick and 4½ inches of insulation, encased in a 3/16 inch thick steel shell. The grates which are 10 ft. below the roof arch, are 3 ft. above the level of the operating floor. Beneath the grates is a conical steel ash hopper, lined with paving brick, which will hold a truck load of the accumulated ash.

Garbage and rubbish from the charging floor above the furnace are dumped or pushed through a 36-in. diameter opening in the top center of the incinerator. Hot gases of combustion leave the furnace through a side gas outlet just below the conical roof arch and then pass downwardly through a circular combustion chamber and out through the breeching to the stack. A refractory, guillotine-type damper in this breeching is used to control draft on the incinerator.

The combustion chamber is also a vertical, cylindrical structure 2 ft. smaller but of construction similar to that of the furnace.

A covered opening is provided in the top center of the combustion chamber for disposing of animals, unusual wastes, or condemned foods which might be of such size as to require a long time for incineration.

Details of the Hearth

The total projected area of this furnace inside the firebrick walls is 74.5 sq. ft. Extending up above the grates in the center directly below the charging hole is a slowly revolving cast iron cone approximately 5 ft. diameter at the base and 2 ft. high. Two stoking arms are attached to the cone, set at a tangent to the base, so that the material is gently raised as the arms pass beneath the mass and at the same time the material is slowly moved out towards the periphery of the furnace. The angle from horizontal of the leading face of the arms is adjustable and controls the relative amount of lift and of outward motion of the refuse.

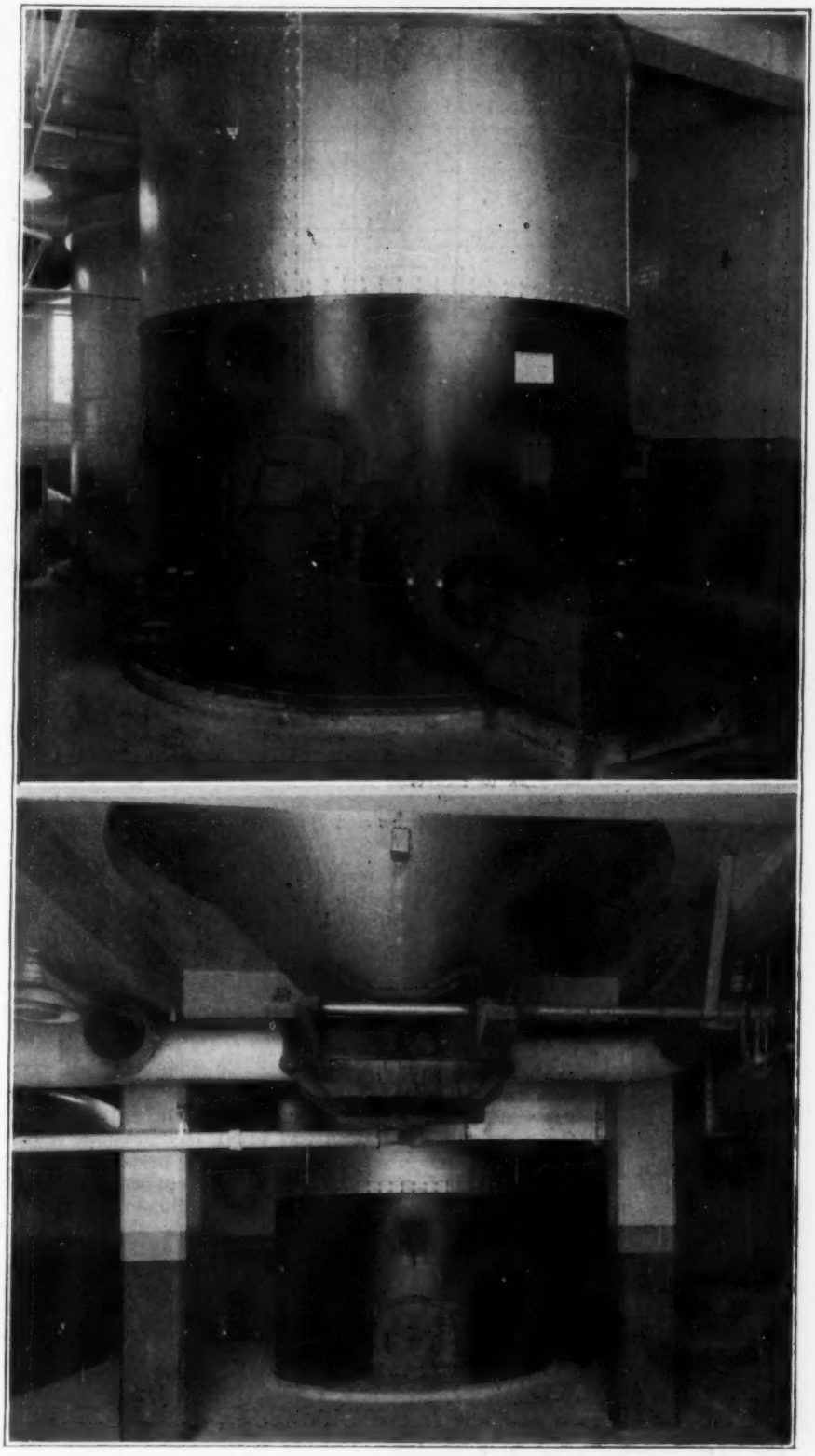
The cone, back side, and end of the arms have numerous holes approx. 1 in. square, through which air is blown under slight pressure. This gives intimate contact of air and material insuring rapid drying and combustion.

The cone is attached to a hollow, vertical shaft which is slowly revolved by chain and sprockets running to a small worm gear reducer. Only a fraction of a horsepower is required for revolving the shaft and arms, actual consumption being below ¼ hp. A ½ hp. motor is installed for overloads and a shear pin is provided in event of an obstruction in the incinerator.

Air from outside the building is drawn into the combustion air fan and is blown through two damper controlled ducts, one leading to the cone and arms and the other to the ash hopper below the open grates.

Surrounding the central shaft set approximately 1 in. below the cone and arms is a circular, solid, cast iron hearth. This extends out under the area covered by the sweep of the shaft and arms.

In the annular space between the central solid hearth and the furnace walls, there is a series of dumping grates. Sixteen grates arranged in eight pairs provide an almost continuous ring of dumping grates. When there is sufficient accumulation of ash and non-combustibles on the grates, the rotation of the cone and arms is stopped, and the grates are then dumped, allowing ash to fall into the ash hopper. Grates are raised to nor-



100-Ton Monohearth Incinerator
(Above: Burning hearth; waste heater, left rear—Below: Ash removal floor —combustion chamber in rear)

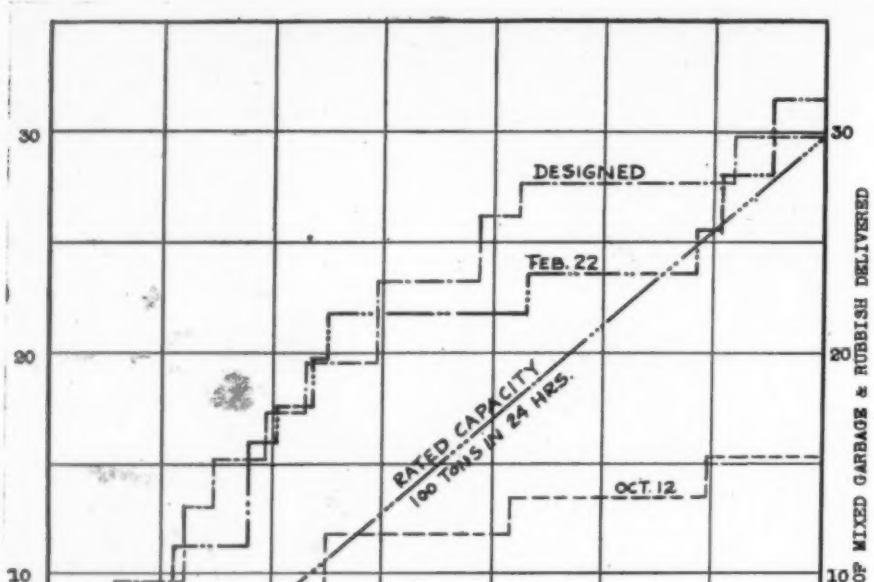


Fig. 1—Study in Coordination of Deliveries and Burning Capacity of Incinerator

mal position by a convenient handle and locked in position.

The burning rubbish piled on the solid central hearth and over the cone is then spread out over the open grates by starting rotation of the cone and arms and the furnace is ready for a fresh charge. The hard manual labor of stoking and cleaning fires is thereby reduced to a minimum and the time required for cleaning fires and starting full scale operations again is also cut to a minimum. All of this results in greater capacity for a given size furnace.

With total projected area of the 9 ft. 9 in. inside diameter incinerator of 74.5 sq. ft. and a rated capacity of 100 tons per 24 hours the combined drying and burning rate is 112 lb. per sq. ft. of projected area per hour. The standard practice on manually stoked furnaces of conventional design is only 50 lbs. rate on the total projected area. The open burning grate area on the Monohearth unit is 38.7 sq. ft. and the rate of burning is 216 lb. per sq. ft. per hour. (Accepted practice on manually stoked incinerators is generally 75 lbs. per sq. ft.)

Operating Staff

The operating staff now includes a foreman and three men. The charging is done by two men, one using a small size bulldozer, and the other moving the material through the charging hole and operating the cover. The third man works on the stoking floor, stoking part time to supplement the mechanical stoking arms, operating the forced draft, and dumping ashes with the help of one of the other men, as required. The foreman supervises the general plant operation. Ashes are removed from the plant by men between charges to the furnace.

There is time for the men to maintain the building in better condition than was previously possible, and it is intended that the present forces will keep up the adjacent grounds, mowing the grass in the summer, and performing necessary snow shoveling in the winter.

There is now a direct saving of one man's time, as compared with previous operation, against which is chargeable the operation cost of the bulldozer, (estimated at $75.00 per year), and the operation cost of the ¼ hp. motor driving the mechanical stoker, which taken in combination with the other power charges, is negligible. These off-setting costs are reduced by the fact that the forced draft fan on the new incinerator is of smaller horsepower than the old one, and is used only about one-half as much. Exact time periods of operation for comparison are not available so no exact figure can be given but it is probable that the total net saving exceeds $1,500.

Garbage Loads

The tonnage of material delivered to the incinerator during the years 1942-1943 is shown in the following table. The monthly variations in the Town of Tonawanda are less than the variations in the average of five other cities for pre-war years. This may mean that these percentages will prevail in post-war times. If so, there will be higher peaks, particularly during August and September, when peaks may be 50 per cent in excess of the average, rather than 25 per cent observed now.

Peak loads, during these two years, exceeded 30 tons per day in every month, exceeded 40 tons per day in four months, and exceeded 50 tons in one month in 1942. The periods of burning when the loads exceeded 30 tons, ran from 10 hours to a maximum of 14 hours when 52 tons were burned.

A study of the deliveries to the incinerator when it was first placed in operation, showed that it was necessary to space the deliveries at more regular intervals to secure the benefit of the full furnace burning capacity and this was done. When the balance of the charging floor can be built, more storage space will be available, and the matter of delivery time will cease to be so important. The study in the coordination of deliveries and burning capacity is shown in Fig. 1.

A Burning Test

Tests recorded the burning rate in the incinerator as exceeding 105 tons for 24 hours with satisfactory results as to ash and products emitted from the chimney.

TABLE II

1942-43 Garbage Loading—Town of Tonawanda, N. Y. (Including the Village of Kenmore)

The Monthly Per Cent is the Per Cent of the Total for the Year Collected in Any One Month

Month	1942 Tons	1942 Monthly %	1943 Tons	1943 Monthly %	Average 5 Cities Monthly Per Cent 1937-1938
January	631.5	8.22	821.3	9.6	6.1
February	563.3	7.3	636.8	7.4	5.4
March	627.9	8.2	690.4	8.0	6.9
April	666.2	8.7	644.1	7.5	7.1
May	622.8	8.1	684.7	7.9	7.7
June	620.2	8.1	762.7	8.9	9.0
July	641.4	8.4	730.1	8.5	9.7
August	666.4	8.7	688.5	8.0	12.0
September	772.1	10.0	852.9	9.9	11.2
October	674.7	8.8	759.5	8.8	9.1
November	563.9	7.3	630.0	7.3	7.8
December	638.2	8.3	700.0	8.1	7.2
Total	7,688.7	100.0	8,601.0	100.0	100.0

Tests were conducted on temperatures during operation, effect of charging time, effect of the outside temperature, and effect of the use of the mechanical stoking arm. A chart showing the conditions of operations for Jan. 9, 1945, is shown in Fig. 2.

It is noted from the chart that the charging time averaged about 5 minutes, and resulted in a temperature drop in the incinerator of about 300 degrees. The operators try to keep the temperature in the combustion chamber at about 1500° F., so that during charging periods the temperature will not drop below 1200° F. The drop in temperature after 12:00 Noon, and after 2:30 p. m., is caused by lack of material. The outside temperature was 10° above zero, so the forced draft air was cold. The material delivered was all frozen, averaging approx. 30° F.

The stoking arm was operated for about four hours, or about one-half of the active burning time. The ashes were removed three times during the day. The ash from the late afternoon burning was removed next morning.

On this day, the total garbage and refuse burned totaled 59,900 lbs., or almost 30 tons. The ash removed was 6,300 lbs., which is slightly more than 10 per cent of the charge, but it is probable that if the ash which was accumulated during the late afternoon, but not removed until the next day, had been added, the total percentage might be about 12 per cent.

As a result of these studies, during winter months the operators were instructed to bank their fires at the end of the day's run and lower the damper to a 4-in. opening to produce as high a residual temperature in the morning as possible. With warmer temperatures and this change, starting temperatures are generally above 500° F. Part of a load is left on the charging floor at night so this can be used to start a fire in the morning before the first load arrives. With this practice, the temperature is usually above 1300° F. by the time the first load arrives.

Contrasting with conditions on these cold, wet days, there have been some days during dry weather, when there have been heavy deliveries of combustibles from the industries, in addition to regular collections. At such times, the temperatures have approached 2000° F. and it has been necessary to take precautions against a further rise in temperature.

Advantages of the New Incinerator

We in the Town of Tonawanda in the short period of operation which we have experienced, have observed the following advantages for the Monohearth incinerator with mechanical stoking and temperature control.

(1). The mixing action of the rotating arm, together with the introduction of air, permits burning to start quickly thereby bringing the furnace up to operating temperature sooner.

(2). There are fewer and shorter periods required for dumping ashes, thus decreasing the operator's time required for this purpose, and preventing excessive drops in furnace temperature.

(3). There is more uniform burning of material on the hearth.

(4). There is less fly ash and partly burned material emitted through the stack.

The Town has inaugerated certain rules and provided facilities for the comfort and protection of the workmen. When the plant was built, the walls and ceiling were painted light colors to provide a light, cheerful interior, which has encouraged the men to keep the building clean.

The building as a whole, but particularly the charging floor, is thoroughly cleaned once a week, with disinfectants being sprayed on the floors and walls.

Safety belts are used on the charging floor. Safety face shields, and asbestos gloves are provided for use when stoking the furnace. Goggles are provided for the men when removing ashes.

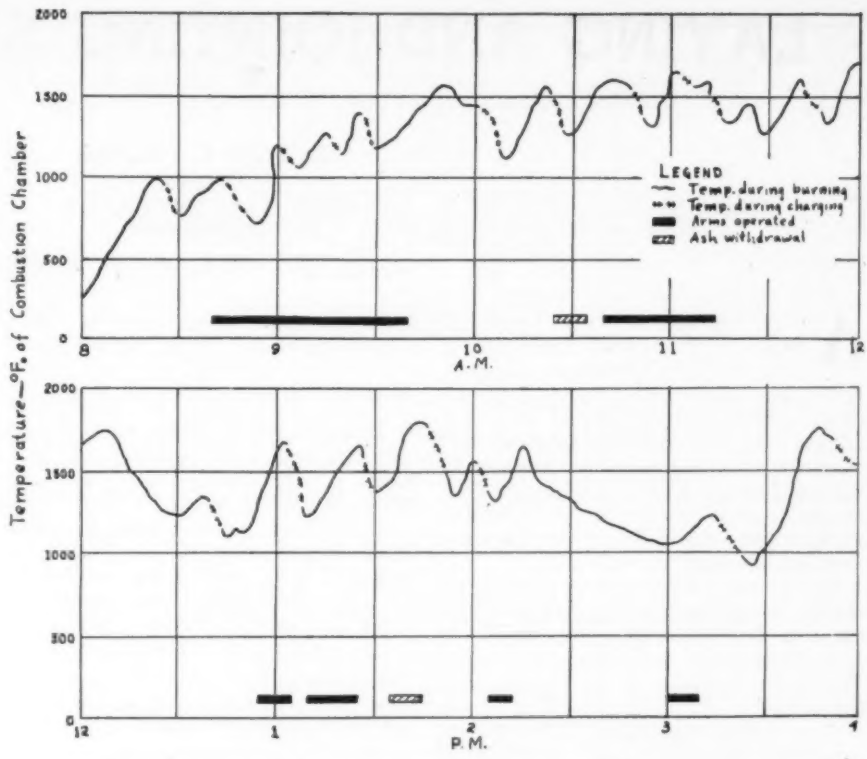


Fig. 2—Chart Showing Temperature (degrees F.) of Furnace During Test Run *(Test Jan. 9, 1945—Air Temp., 10° F.; garbage temp., 30° F.)*

Advantages of Locating Sewage And Garbage Plants Adjacent

Something can very well be said about the advantages of having a municipal garbage incinerator, and a municipal sewage treatment plant located on adjacent sites. (The Town's No. 2 sewage treatment plant with a capacity of approximately 6 mgd., lies immediately to the west of the incinerator.)

There is great rivalry between the two forces with regard to housekeeping and the appearance of the plant grounds. The Town in peace times has made a practice of having school and club groups visit the plants. Then the men strive to outdo each other.

When large amounts of scum, grease, rags or other materials which the operator does not desire to place in the sludge digesters, arrive at the sewage treatment plant, it is taken over to the garbage incinerator, and burned in the combustion chamber.

A chemist is on the staff of the sewage treatment plant and when analysis of garbage samples is desired, the samples may be analyzed in that laboratory.

The selection of a site for either facility is frequently a troublesome matter. In this case, the sewage treatment plant site was chosen about 1924, and the incinerator site, adjacent to it, a year later. There were no objections to the site on the part of the Town's inhabitants. From the standpoint of required travel for collections, the location has not been expensive.

Now, the Town proposes to build a water filtration plant on additional land acquired, immediately to the south. If and when this is completed, three of the major features of a Department of Public Works will be located together. At such time, consideration could be given to the creation of the position of Commissioner of Public Works, who would have administrative charge of all three activities. At the present time, one member of the Town Board is appointed Chairman of the Municipal Improvement Committee to review matters pertaining to Public works. [For some years this office has been held by the senior author of this article.—Ed.]

LAYING AND JOINTING SEWER PIPES

By FRED C. PALMER
Engineer
NAT'L SEWER PIPE CO., LTD.
TORONTO, ONT.

AT the convention of the Canadian Institute on Sewage and Sanitation, held in Toronto in October, 1944, the question of preventing roots from entering sewer pipes and the annual cost for removing the same, apparently gave considerable concern to the members, and although lengthy discussions took place, it is doubtful whether any complete solution to the problem has been arrived at.

The writer, while not scheduled or invited to speak upon the subject, ventured a few remarks, and has since been invited by the editors of *Water Works & Sewerage* to go further into the subject.

This paper has been drawn from practical experience and experiments, carried out over years, to produce a root-proof and leak-proof joint.

It is also intended to explain, without scientific data and complicated formula, so that the workman, the pipe layer or contractor may be conversant with the many reasons why joints may be defective. The writer is conversant with the many inconveniences and difficulties which confront the contractor and his pipe layer—wet and muddy trenches, threatening storms and cave-in, all of which tend to make difficult the workmanship being carried out.

Roots

Roots will not grow through solid concrete or a solid cement joint, unless there is an opening. They will grow through the very finest hair crack. Roots will not grow through a properly made compound (bitumen joint), but will find their way through a blow-hole or improperly heated compound.

At the tip of a root is a very fine tendril, finer than a human hair. As this tendril grows and reaches a sewer pipe joint, it turns and glides over or under solids, but reaching the finest opening, it enters. Upon entering, the movement of air and flow of sewage draws it in and the warmth of the sewage and its fertilizing properties induce rapid growth. Roots in sewers can be temporarily removed by tools and machines and in some cases their growth can be retarded by the use of chemicals, but they cannot be permanently removed without re-constructing the sewer.

It is not the intention of the writer to deal with the removal of roots from sewers, but rather to suggest means and best methods to prevent their entrance.

Some Types of Joints

The necessity for secure joints is no new problem. Forty years ago engineers introduced the following joints, as shown. These joints are all cast upon the pipes by the pipe manufacturers. (Fig. 1)

Duckett's Patent Stanford Joint (a)

On the spigot and in the socket is cast a bituminous material gradually tapered. Before fitting the pipes together the joints are greased with a mixture of resin and Russian tallow. This makes a tight joint, but it is advisable to finish it off with a seal of cement smoothly trowelled.

Doulton Patent Joint (b)

This is similar to the Stanford with less bitumen and a heavier cement seal. The manufacturer's claims for this joint—imperishable, flexible and can be laid under water.

Tyndale's Patent Double Seal Joint (c)

The convex ring on the spigots makes possible a tighter fit than tapers. The socket of the pipe is deeper and undercut to permit an effective seal with cement.

Button's Patent Joint (d)

These rings are cast with annular grooves. When the pipes are fitted together a grout cement is poured in, which flows and sets between the bitumen rings.

Hassel's Joint (e)

Two cast bitumen rings and two perforations in the socket about three inches apart. After the pipes are fitted together a grout cement is poured into one of the perforations and pouring continues until the grout comes up into the other perforation.

Sykes' Patent Joint (f)

The pipe for this joint is especially manufactured with a flange near the spigot end. The bitumen is moulded in a screw-like thread. Before fitting together a special adhesive cement is spread over the bitumen threads and the pipes are then screwed together. This gives an exceptionally tight joint.

The foregoing joints are shown and described primarily to point out that *expense in jointing becomes secondary to efficiency.*

There are no special joints cast or moulded on sewer pipes by pipe manufacturers in Canada, and the writer is not aware of any joints cast or moulded on sewer pipes in the United States by pipe manufacturers, excepting perhaps special acidware pipe.

There are patent joints, mostly manufactured by chemical companies. These include Patent Rubber Rings, Pre-Cast Compound Joints and Compound for Pouring Joints. These joints require skill and care in their making.

The Rubber or Rubberoid Ring is manufactured to fit the size of pipe re-

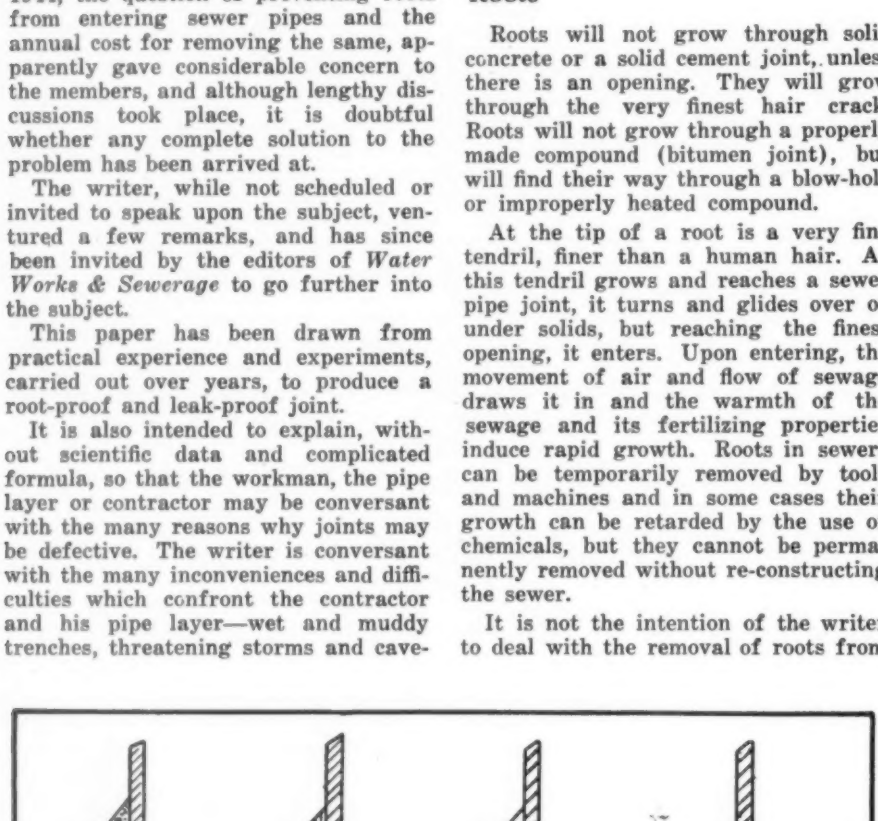


Fig. 1. Special Joints Patented by Engineers

quired. A cut-back oil is used to aid adhesion, the socket is painted with the cut-back and the ring placed in the socket, then the ring is painted with the cut-back on the inside and on the outside of the spigot and the pipe fitted home. With reasonable care, this is a good joint, but sewer pipes vary in dimensions, such as inside width of socket and outside width of spigot. The variation may be according to the dies of the manufacturer or shrinkage in burning the pipes.

In this, as in any other pre-cast joint, it is necessary to ensure that the pipes used are adaptable to the joint. Some manufacturers supply deeper and wider sockets than others and again some manufacture thicker bodied pipes; and, in burning, sewer pipes vary in shrinkage.

Compound for Either Pre-Cast or Poured Joints

Without going into detail of chemical formulae, Bitumen Jointing Compound consists of approximately 50 per cent asphalt oils and 50 per cent filler, which may be marble dust, slate dust or other aggregate. The heavier the filler, the more difficult it is to hold in suspension; consequently the necessity for repeated stirring during heating and always immediately before dipping out for pouring is evident.

If the compound is left unstirred, the filler sinks to the bottom and on a hot fire will, with the asphalt at the bottom, burn, leaving a residue like coke in the bottom of the pot.

If the compound is poured without having been stirred, the joint will be defective. It will develop blow-holes and through being poured with insufficient filler will overshrink.

When bitumen compound is first used, the pouring temperature as recommended by the manufacturer should be checked with a thermometer so that the workman can become conversant with the appearance and the consistency of the material as it reaches the pouring temperature. Having observed this, he will not need to continuously use the thermometer.

The Trench

Regardless of the fact that the suggested or specified width of trench receives consideration with respect to load on the pipes, a width sufficient to allow proper laying and jointing of the pipe is essential. The use of digging machines and the composition of material to be excavated and weather conditions sometimes prevent the excavating of the trench at a width specified. The trench, naturally, will vary either less or over width.

Four inch to eighteen inch pipe can be straddled by a medium sized man and joints can be made all around from above the socket. Beyond that size, joints have to be made from the sides of the pipe; therefore a satisfactory working width is required. These widths in practice are found to be as follows:

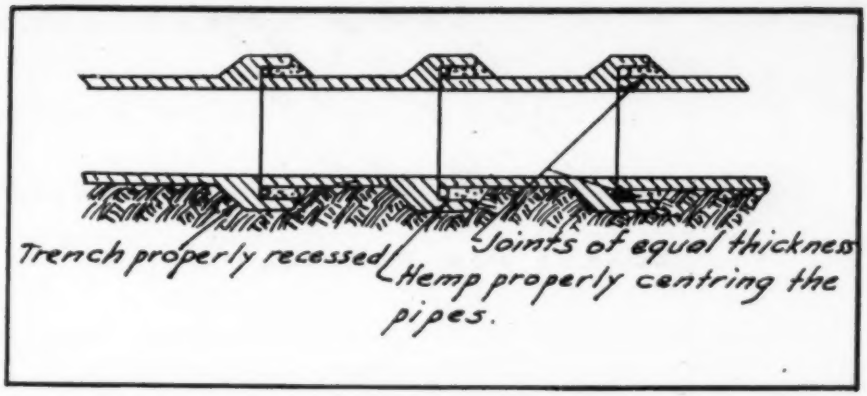


Fig. 2. Correct Sewer Pipe Laying and Jointing

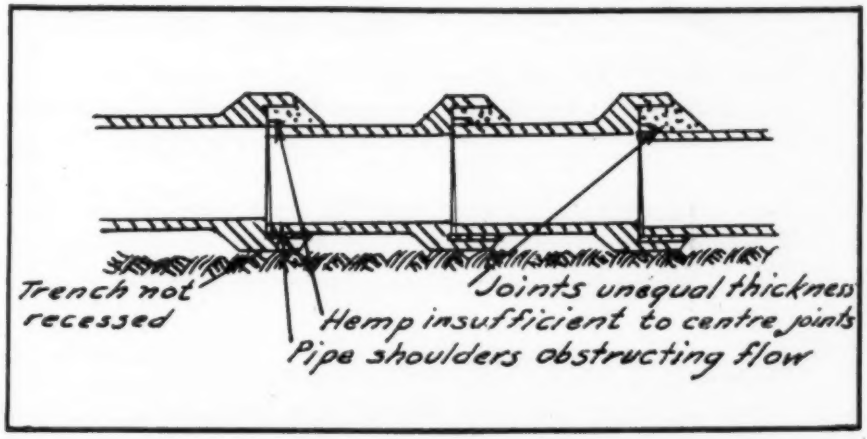


Fig. 3. Defective Sewer Pipe Laying and Jointing

Pipe Size, In.	Trench Width, Ft.	In.	Pipe Size, In.	Trench Width, Ft.	In.
4	1	6	21	3	9
6	1	9	24	4	0
8	2	0	27	4	4
9	2	0	30	4	9
10	2	3	33	5	0
12	2	6	36	5	6
15	2	10	42	6	3
18	3	3			

To ensure good joints the bottom of the trench must be recessed to take the socket of the pipe, as shown in Fig. 2. This is important for two reasons: it gives a bearing along the whole body of the pipe and allows an equal annular space (after the jute or long strand hemp is placed in) to allow a good body of cement or compound all around the jointing space. (Fig. 2)

LAYING AND JOINTING

If the pipe sockets are not recessed, the result will be as shown in Fig. 3. They will be bearing only on socket to socket and the annular space at the bottom of the socket will not be centered sufficiently to hold the required amount of cement or compound. Also, a shoulder causing obstruction as also shown, will be the result.

Juting

Jute, commercially known as Long Strand M.O. (minimum oiled) Hemp is used either with cement or compound in jointing. This hemp is sold in rope form, ranging from 10 to 35 strands loosely twisted. These strands can be separated according to the thickness required to center up the pipe. Hemp is used for two purposes—to center up the pipes as referred to above, and to prevent cement or compound from entering the inside of the pipes.

It is quite improper to see on sewer construction jobs, the pipes standing socket down along a trench, and one or two strands of hemp twisted around the spigot end ready to be lowered into the trench. The pipe layer should measure the circumference of the pipe he is about to lay by putting this hemp around it, then cutting it in lengths 4 to 6 in. longer than the outside circumference of the pipe. He should pull apart from the rope a sufficient number of strands to fill in thickness (not depth) the annular space between spigot and socket. These strands of hemp should be in the trench with him, not put on the pipe before they are let down.

When ready to fit a pipe into another, the hemp is used to guide the pipe into the socket and is carried into the bottom of the socket with it. The top and sides are then rammed in with a piece of hardwood or caulking tool. It is sometimes specified to dip the hemp in a grout cement first. This does im-

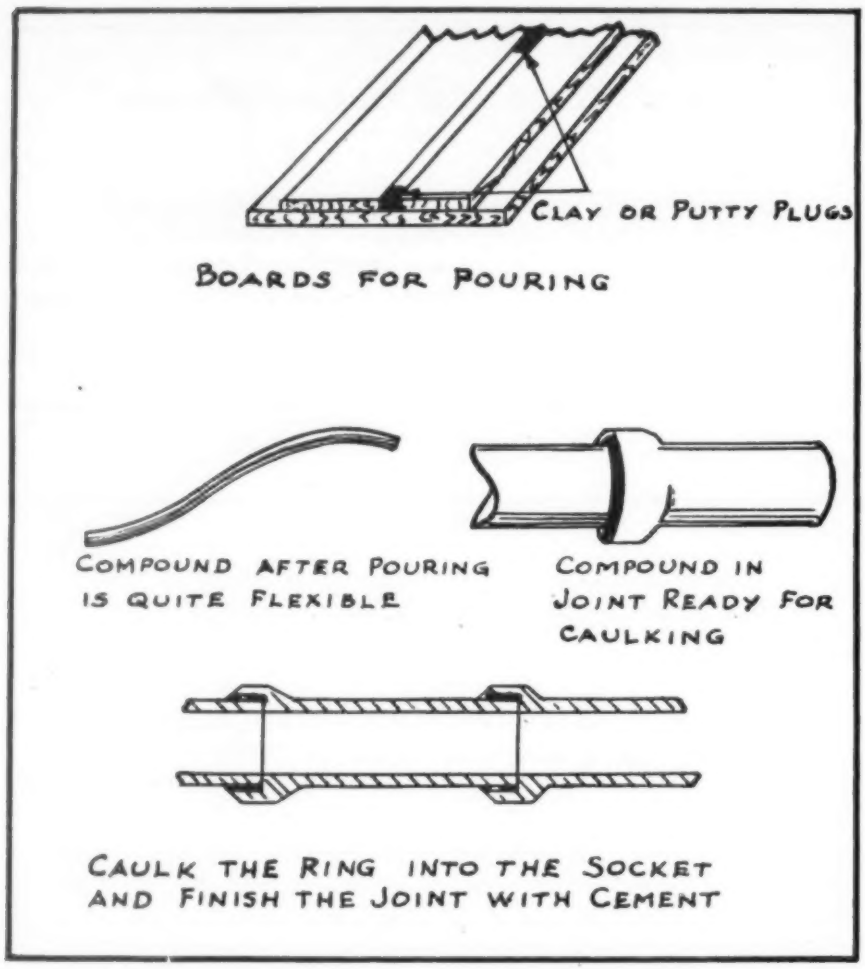

CLAY OR PUTTY PLUGS
BOARDS FOR POURING
COMPOUND AFTER POURING IS QUITE FLEXIBLE
COMPOUND IN JOINT READY FOR CAULKING
CAULK THE RING INTO THE SOCKET AND FINISH THE JOINT WITH CEMENT

Fig. 4. Combination Compound and Cement Joint

prove the joint, when making cement joints.

The pipe layer holds the strands of hemp rope in one hand and puts the rope across his thigh; he rolls it with the palm of his other hand, which twists the strands together, then holding both ends with one hand he can dip his hemp. Then with an end in each hand he places it under the spigot and guides the pipe into the socket.

Compound Pouring

In pouring compound joints considerable time is saved by ensuring that the running rope is secure and tight in or against the socket, as the liquid when poured is liable to run out of the space. It is well to plaster trench clay around the running rope where it fits against the socket.

The running rope is asbestos, square or round. Round is preferable for sewer pipe. Before using, the rope should be well rubbed with moist clay or graphite to prevent the compound sticking to it.

Compound should be poured slowly in a steady stream and continuously if possible. The weather condition (temperature) should be observed. It is likely in cold weather and particularly with 15 inch pipe and over that the compound will set before flowing to the bottom of the pipe. In this condition, it is well to thaw out or warm the spigots with a lighted rag and kerosene.

Cement Joints

When making cement joints in warm or hot weather, the spigot of the pipe or the whole pipe, should be well wetted, otherwise the moisture in the cement at the joint will be absorbed by the pipe and sufficient moisture will not remain in the jointing cement to allow it to set without cracking.

If neat cement for jointing is used, the joint must be kept moist while setting, particularly in shallow dry trenches.

Providing the pipes when laid and jointed are not immediately disturbed by common faults, such as walking on the pipes, climbing in and out of the trench on the pipes, placing a heavy cement pail roughly on pipe where it lodges on the shoulder of the pipe and leans on the side of the trench, immediate backfilling, knocking joints to pieces and disturbing joints newly made or removing shoring too hastily, the writer has obtained best results from the following:

One part portland cement, two and one-half parts clean, sharp sand. Mix dry, then add sufficient water to dampen, then mix (dampen only). Allow to stand forty-five minutes, then add sufficient water to bring to the consistency for good trowelling. This mix and the time allowed to prehydrate with moisture, eliminates shrinkage and gives excellent adhesion.

RECOMMENDED JOINT

The writer prefers and recommends the following joint, favorable under any conditions, and as near fool-proof as jointing can possibly be. Use a good jointing compound, such as "G-K," or equal. Place a board or plank on the ground near the melting pot (Fig. 4) and measure the width of the annular space between the spigot and the socket of the size of pipes to be jointed. Place two boards upon the board or plank already placed and space the two top boards the width of the annular space to be filled and have the two top boards thick enough to be two-thirds the depth of the socket of the pipe, or space your top boards at a distance equal to two-thirds the depth of the socket and as thick as the width, either way will do.

Put a good coat of wash (composed of whitening and water creamy in consistency) with a brush between the space of the boards. This is to keep the compound from sticking to the boards. Put a plug of trench clay in the boards at each end or at a distance equal to the circumference of the pipe or pour several lengths at one pour.

Pour the compound steadily backwards and forwards into the opening, leave it ten minutes to properly set. When one side board is taken away a compound strip, rubber like, has been made.

In warm weather this will be found quite flexible; in cold weather the rings can be kept flexible by laying on a board near the heating pot. Fit it into the joint space and caulk the joint with a piece of hardwood or caulking tool, then cement the balance of the annular space. This will give a waterproof and root-proof joint, with a minimum of labor.

In very wet trenches it is suggested that after caulking in the first ring a second ring be caulked in and the cement eliminated.

The importance of laying and jointing sewer pipes has been recognized by the government of the Province of Ontario, which last year passed a bill enabling all towns and cities to license sewer and drain layers. Men doing this work should be classed as skilled labor. They should be made conversant with the engineers' specifications and the importance of proper laying and jointing should be conveyed to them personally by the engineer or inspector.

They should be made to feel that the importance of their work is appreciated and confidence is placed in their ability to do their best under sometimes very difficult circumstances.

Definite and complete specifications by the engineer and co-operation of the contractor and his pipe layer will eliminate root trouble and infiltration.

SWAT THAT FLY!

Flies Can and Should Be Killed at Sewage Plants

By GEORGE E. SYMONS
Assoc. Editor
WATER WORKS AND SEWERAGE
NEW YORK CITY

IN the cosmic scheme of things, there may be a place for the fly, but if so, no one seems to have found it. Even the Holy Bible mentions the fly but once, whereas it mentions water more than 800 times. Entymologists have generally accorded the bee his place, along with many other insects of importance, but the common house fly must belong to that group of unwanted and undesirable insects that cause an estimated damage of two billion dollars annually in the United States alone.

One might expect in this magazine, an article on the Psychoda fly, the bane of the trickling filter operator's existence—but the control of the Psychoda fly is quite generally known, for flooding of filters has been successful, as has the application of chlorine either continuously or intermittently. Recent experiments by R. W. Simpson, San. Engr. at Keesler Field, Biloxi, Miss., have indicated the marvelous new insecticide DDT is also quite effective when added to the dosing tank. So it is the common house fly about which I want to write because I don't like flies in the house or in a sewage plant.

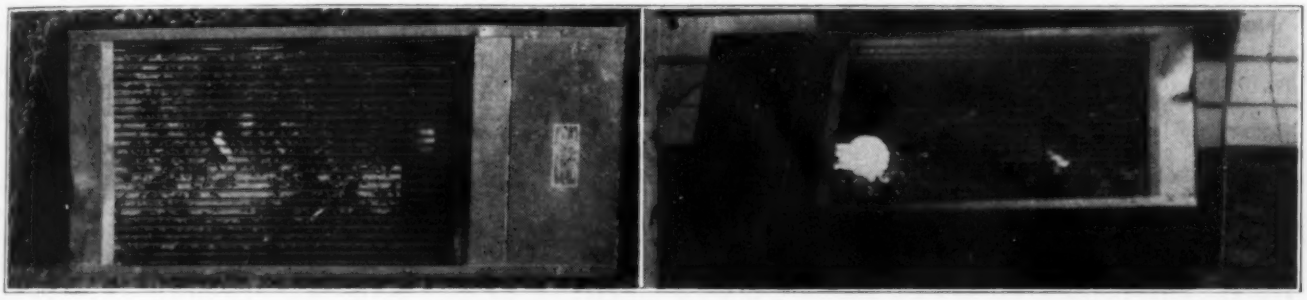
An Aversion to Flies

It was twenty years ago while working for Dr. W. D. "Hap" Hatfield at Decatur, Ill., when I first developed an aversion to flies. We were making a pollution survey of the Sangamon River and endeavoring to locate old sludge banks that were supposedly adding to the odors allegedly coming from the sewage treatment plant.

Tracking down a particularly disagreeable stench, deep in the woods along the river bottom, we found an old, dilapidated—but still used—rendering plant, with the remains of no few horses and cattle strewn about and—as they say in Texas—Jillions of flies. Right then and there my pet aversion to flies was born.

A year or so later while in further pursuance of the study of sanitary engineering, that aversion increased when I learned that in 1912 or thereabouts, the late D. D. Jackson had shown in Florida that typhoid epidemics which came late in the summer were usually fly-borne and could be reduced by screening outside toilets.

And then but a few years ago, at Buffalo, the late Dr. Trask with Dr. Paul of Yale University demonstrated the presence of the virus of poliomyelitis in sewage and a year or so later demonstrated that that same infantile paralysis virus could be found in flies that had access to virus infected sewage. That was enough for me—from then on I wanted to be rid of every house fly in every sewage plant as well as every house.



Electric Fly Traps at Buffalo
(Left: On lawn outside of building. Right: Beneath window in Sludge Incinerator Bldg.)

Facts About Flies

Did you know that a single female house fly (*musca domestica*), if all of its descendants lived and bred, would be the ancestor of several billion flies by the end of the summer? A new generation of flies under normal conditions may be expected every ten days, and the average egg deposit of each female fly is 120 eggs. That, and the fact that hatching and breeding proceed more fully with warm weather shows why the fly population increases throughout the summer until the early frosts.

Of course you know that flies live in filth, breed in filth, and contaminate everything with which they come in contact, but did you know that the normal range of a fly can be covered by a circle with a radius of 300 yards or that apartment house windows aren't screened above the seventh floor because flies usually don't fly that high?

A fly can walk upside down because it has suction cups on its feet and its feet carry thousands of bacteria as well. The decrease in milk in the summer from dairy herds is caused by flies, and according to Col. Dwight M. Kuhns, Medical Corps of the U. S. Army, the fly has been the most menacing aerial foe of our troops.

Diarrhea and dysentery are the principal diseases spread, in addition to typhoid fever, and latrine control is essential in army camps. As long ago as the Spanish-American war, the part of the house fly in the spread of disease was discovered, and while sanitary practice indicated the need for control, such control has not always been completely carried over into civilian life. Even in the present war, lack of proper fly control has had disastrous results.

Col. Kuhns has reported a massive epidemic of bacillary dysentery in one camp with the causative organism being Shigella paradysenteriae (Boyd 88) and the transmitting vector, the common house fly.

Flies always seek shelter during the heat of the day and during the cool of the night. Hence their attempt to enter houses in daytime and to rest on the ceiling at night. Flies also attempt to enter houses during or immediately before thunder storms. Flies likewise bite before storms, but are not generally a biting insect.

The fly has a thousand, more or less, lenses in its eye but why it should want to see a thousand images is a mystery; and why anyone would want a fly for a pet is even more of a mystery. Yet, according to Robert L. Ripley, in his

syndicated cartoon, "Believe It or Not," "Mrs. K. R. Johnstone of Brevard, N. C., had a house fly for a pet for ten months. It would come at her call, and sleep on her pillow at night and defend her against any common vulgar flies."—Ugh! What is more *vulgar* than the *common* house fly?

The fly has not, as have many other insects, been celebrated in song and story. Probably the most famous (the Biblical Quotation in Isaiah probably did not refer to the house fly) was John Steinbeck's classic in "The Moon is Down" when through one of the characters, he said, "The flies have conquered the fly-paper," referring to the Nazis in Norway.

Lesser known perhaps is the fairy tale story of the Little Tailor, picked by the king to defend the castle, because he had been heard to exult—"I killed seven at one blow." The king didn't know that the seven were house flies.

Another poetic quotation appears in a poem generally credited to a great Hoosier poet. In "The Passing of the Back-house," appear these lines about the well-known privy:

"All day fat spiders spun their webs
To catch the buzzing flies,
That flitted to and from the house
Where Ma was baking pies."

That should serve to remind us of the hideously awful potentialities of the house fly, for although the back-house has passed in many localities there are still sewage screenings, sludge, and sewage with which the fly can and does come in contact.

Fly Control

Fortunately there are means of controlling the pest. Probably one of the most dramatic fly catchers is the "Venus Fly Trap," an interesting plant which very effectively catches and devours any insect that chances to touch its delicate tendrils. But the "Venus" seldom catches more than one insect at a time and requires some time to devour it.

Of more practical significance are the insect sprays. Pyrethrum and rotenone are well known, as have been many other commercial sprays. One slogan became a national catch-word—"Quick, Henry, the Flit."

Some of these sprays, such as pyrethrum, often fail to accomplish the desired result, either because of lack of sufficient concentration of the spray or because it is mainly more effective against the male fly.

The marvelous and now famous DDT chemical which kills flies as well as roaches, mosquitos, and other unwanted insects, body lice, etc., and its use as a spray or aerosol bomb has had wide study and received much publicity in World War II. Its effectiveness, its weakness, its disadvantages are now fairly well known. This DDT (dichlorodiphenyl-trichloroethane) is so good that painted on a wall it will kill all insects which touch it.

The Agricultural Research Administration has improved the pyrethrum spray making it both less irritating to humans and more effective as an insecticide. A new fly-killing compound has been developed from Southern pine and is called "Thanite," it being the thiocyanate of a secondary terpene alcohol. British chemists have recently announced a new insecticide that has none of the objectionable characteristics of DDT. Most of these chemicals are only now becoming available to the civilian but it should be possible to obtain one of several of these chemical methods of "Swatting the Fly" in addition to the well-known fly swatter itself, and the fly paper, fly paper strips, and arsenic poison that have been sold in grocery stores for years.

There is another fly control method effective where fly populations are extremely high as at sewage plants in late summer. For such locations, and even for the home, the electric fly trap has many desirable advantages.

The Electric Fly Trap

I first saw the electric fly trap, in the form of an electrified screen, installed on the door of a stable for the horses being used by the N. Y. State Dept. of Health for diphtheria antitoxin production, and next as an "Insect-O-Cutor" in the dining room of the Hotel Hershey in Hershey, Pa,, where the z-z-z-z-zig of the flies being electrocuted so intrigued me that I had to investigate. Right then, I had an answer to the nuisance of flies in a sewage plant, and I determined to try one out at the Buffalo Sewage Treatment Works.

During the first three years of operation of the Buffalo sewage plant, it had been observed that the common house fly was a particular nuisance in the sludge disposal building where the temperature was generally above outside conditions because of the sludge incinerators. The nuisance was also observed but to a lesser degree in the sludge pumping station, the sludge digestion tank control building, and the screen room, boiler room and elsewhere to still lesser degree, particularly where there were no screens on the windows. This fly nuisance had led to considerable complaint on the part of the operators, especially at meal times.

In 1941-42 there was some effort made to alleviate this condition in the sludge disposal building. A small screened room was constructed, where the men might eat in comparative freedom from the fly nuisance. About the same time, an experimental electric fly trap was purchased by the laboratory. This particular unit was the smallest obtainable, being 22 in. long, 10 in. wide and 4 in. deep. The unit contained a built-in transformer and a light bulb to attract the flies at night.

A small amount of food is placed in the tray below the bar grid, but after the first few flies have been killed the slight odor of the dead flies will attract more flies. The bar grid is electrified and with the small bars approximately a quarter of an inch apart any fly passing between the bars is instantly electrocuted by the short circuit through its body. The grid may be shorted out by placing the hand upon it with no more than a slight tingle, but the fingers should not be placed near two single bars or the shorted current will burn the flesh.

Ordinarily, a fly passing between the bars on the wing will be electrocuted with only the z-z-z-z-zig of the spark gap and a faint odor. If, however, one of the flies crawls slowly between two bars it will more than likely be consumed with a spark gap and a more intense odor given off.

The electrified screens or electric traps may be advantageously placed at doors or windows where the fly will normally enter in search of shelter from heat, cold, or rain.

Dead Flies in a Sewage Plant

The effectiveness of this trap was fairly obvious as indicated both by the number of flies that were killed, and secondly by the fact that the operators did not use the screened room to any great extent because they found the concentration of flies near the fly trap sufficiently low to be of minimum nuisance compared to previous conditions.

On the basis of three months' observations it was decided to purchase four additional electric fly traps. These were distributed in accordance with observations on fly concentration.

In order to test the correctness of the location it was decided to check the fly kill at the different locations for a period of 48 hours in each. By calculating the average weight of one fly from the weight of a counted hundred flies, it was possible to estimate the comparative fly population density in the different buildings. These figures are shown in the following tabulation:

Flies Killed in 48-Hr. Period

Location of Fly Trap	No. Flies Killed
Grit room (windows screened and all machines enclosed).....	79
Boiler room (no screen doors)...	705
Sludge disposal and incinerator building	1340*

*Two traps about four ft. apart.

It was further observed that during the month of September when the fly population is most dense, one single trap in the sludge disposal and incinerator building electrocuted an average of 2000 flies each day.

Inasmuch as screens were not entirely feasible at the boiler room, or the incinerator building, two traps were put in the incinerator building and one each in other locations.

And so Buffalo "swats the fly" electrically and the number killed each year is enormous, with the sewage plant becoming a less hazardous and more attractive place to work. Other plants might well find that to "Swat That Fly" will bring further credit to the management.

LUBRICATED PLUG VALVES VERSUS GATE VALVES AT SEWAGE PLANTS*

By E. A. LOCKE
Asst. Engineer in Charge
METROPOLITAN DISTRICT SEWAGE
TREATMENT PLANT
HARTFORD, CONN.

FOR many years, the most common means of controlling the flow in pipes, especially in the larger sizes, has been the gate valve. More recently another type, the lubricated plug valve, has been gaining favor with engineers and plant operators. On the basis principally of our experience at the Hartford sewage treatment plant and associated pumping stations, I shall endeavor to discuss some of the salient points of each type, referring in the case of the plug valve to the type in use at Hartford.

The Author

The Gate Valve

The gate valve, as its name implies, controls flow by means of a gate, called a wedge or disc, which is moved into a position to stop the flow by a threaded rod, called a stem, the stem in turn extending through a sealing gland to a handle or hand wheel for operating the valve.

The metal used in gate valves depends largely on the type of service and pressure for which it is designed. The valve body may be brass, iron, cast steel, or forged steel. The bonnet, which is a support and guide for the stem, may be fastened to the body by a bolted or screwed connection, or by a union. The disc may be a wedge type, or a double disc type which depends on a wedge spreader between the discs to force them into close contact with the valve seat. The stem, too, has several different forms, such as a rising stem outside screw and yoke, rising stem inside screw, or a non-rising stem.

The Plug Valve

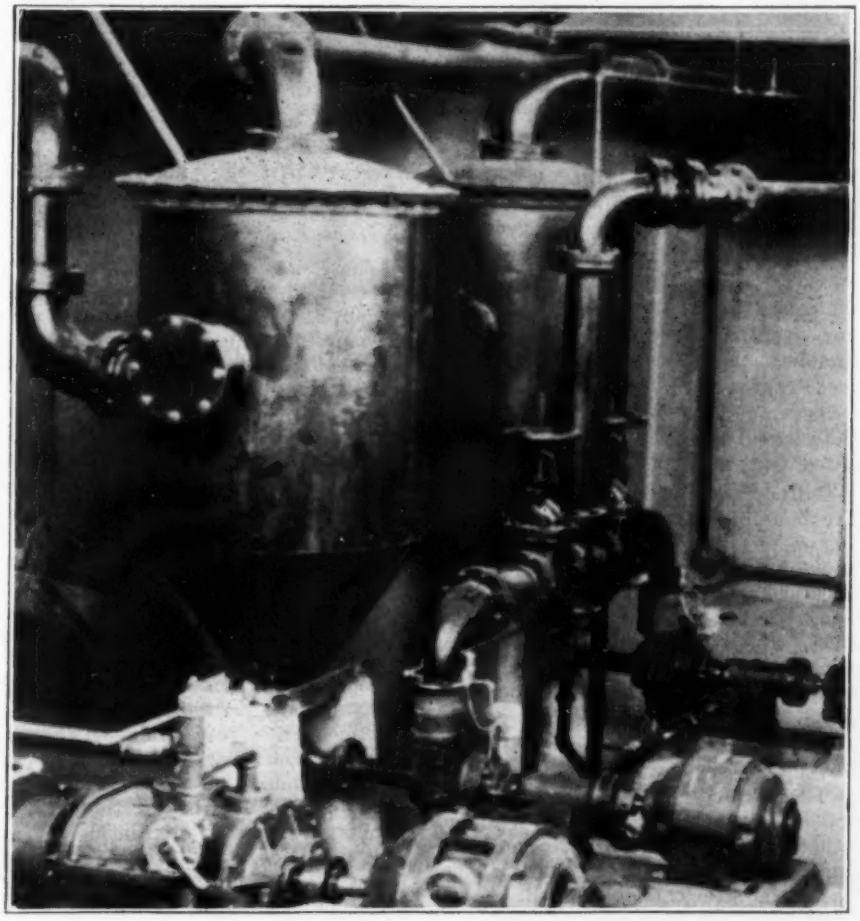
While the plug valve was one of the control devices used in ancient times, the lubricated plug valve is of comparatively recent development. There are two common types, one using a cylindrical plug and the other a tapered plug.

The cylindrical plug valve has a body of sufficient size to enclose a plug, with its axis perpendicular to the line of flow, and with an opening through the plug of cross sectional area equal to the pipe area. The surfaces of contact of both plug and body are machined so that the clearance is from 0.003 to 0.005-in.

This small space is kept filled with lubricant which prevents abrasion of the surfaces and seals the valve against leakage. An extension of the plug, of reduced diameter, projects through the body and has its outer end finished with a square cross section so that a wrench may be used to rotate the plug in the body. The plug is held in the body by a cap of slightly greater diameter than the plug.

A recess in the cap contains a short spiral spring, which exerts sufficient pressure against the plug to prevent leakage at the shoulder, where the operating end of the plug extends through the body. The plug extension has a threaded longitudinal hole into which is screwed a ball check valve.

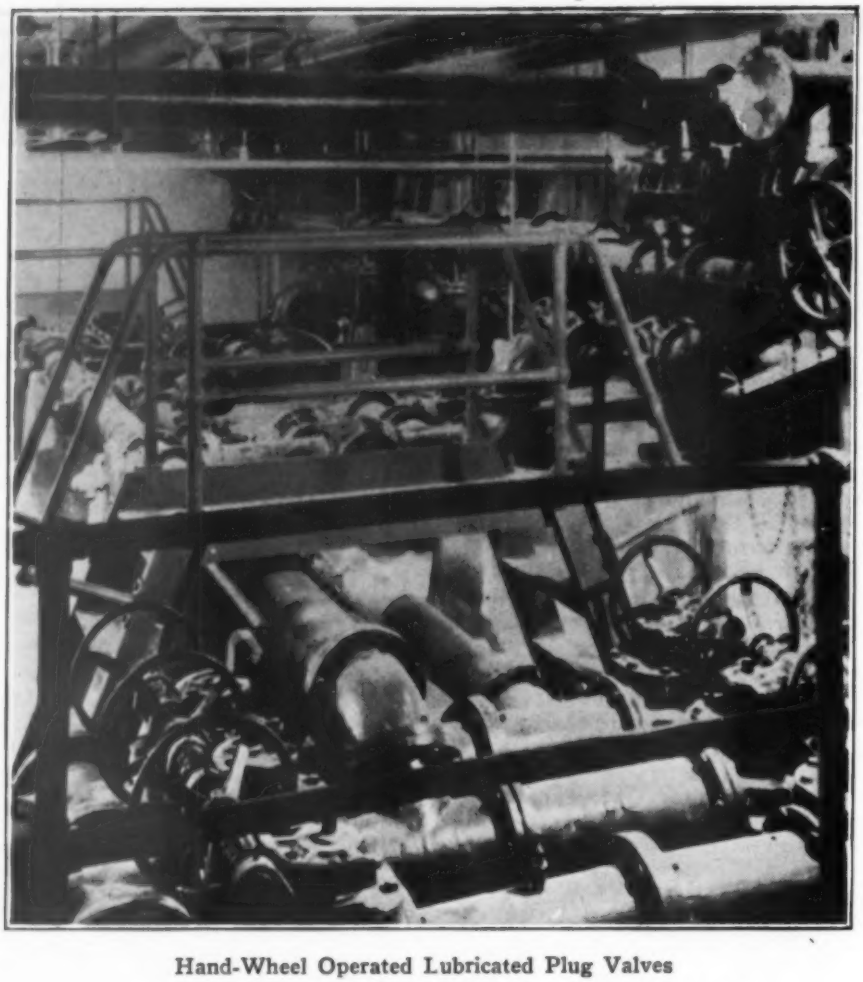
Lubricant, in stick form, is put into the hole and is forced through radial passages to the rubbing surfaces by turning down a feed screw on top of the lubricant stick. The lubricant passages are designed so that the plug will be lubricated when the feed screw is turned down, with the valve in either full open or full closed position. At intermediate positions the grease is prevented from leaking into the flow,



Gate Valves on Discharge Header from Filtrate Pumps

In Filter House Basement—Valves are Used to Isolate Either Pumps for Repairs or Maintenance.

*This paper, read before the New England Sewage Wks. Assn., has been released to WATER WORKS & SEWERAGE by the editor of *Sewage Wks. Journal.*



Hand-Wheel Operated Lubricated Plug Valves

(On Sludge Header Lines in Digestion Tank Gallery.)

as well as when the valve is in full open or closed position.

When the valve is fully charged with lubricant, the plug moves longitudinally away from the shoulder seat, allowing the excess grease to come out and giving visual evidence that lubrication is complete. As soon as operation of the feed screw ceases, this excess lubricant escapes and the spring in the cap forces the plug against the now freshly-lubricated seat.

Cylindrical lubricated plug valves are usually furnished with plugs having a modified rectangular opening of the same area as the pipe, but may be obtained with a circular opening the same size as the pipe, or with a diamond port, which gives a better throttling control, and the "V" port which gives practically straight line throttling control. The two throttling types have ports which are only 50 per cent of the full pipe area.

The majority of the lubricated plug valves is made of semi-steel, although other metals such as bronze and aluminum are used if the service is such that semi-steel cannot be used.

The tapered plug type of valve is of similar construction except that a gland prevents the escape of lubricant when the valve is charged, and the lubricant pressure lifts the plug from the seating surfaces to assure easy operation.

Where Each Type Is Used

There are approximately 146 gate valves and 215 plug valves, 3-in. and larger, at the Hartford treatment plant. Sewage pumping stations constructed since 1938 have installations of plug valves ranging in size from 6-in. to 14-in.

At the Hartford treatment plant gate valves are installed at the following locations: On water and steam lines, on the suction cross connections at the raw sludge pumps, on drain lines for the sedimentation tanks, suction and discharge of the 8-in. and 16-in. sewage pumps, hot water circulating pumps, heat exchangers and on miscellaneous small drain and sump pumps.

Lubricated plug valves are used on the air lines to diffuser plates in the sedimentation tank influent channels; suction and discharge sides of raw sludge pumps; all sludge, supernatant and overflow lines at the digestion tanks; hot water circulating lines at the digestion tanks; sludge and water lines at the elutriation tanks; elutriation pumps; filter sludge feed tank drains; sludge sampling cocks; all sludge gas valves in the gas control house; and gas shut-off valves in the boiler room.

Gate Valve Operation

Gate valves usually have to be set down very firmly to make a tight closure, and, consequently, are sometimes difficult to start when it is necessary to open them. One manufacturer has recognized some of the faults of the gate valve and has developed a type that is lubricated.

If gate valves are operated frequently, they tend to develop leakage because of foreign matter becoming lodged between the seat rings and the wedge. Foreign matter may not only prevent a full closure but also may score the seating surfaces so that there will always be leakage, which generally increases as the metal becomes further eroded by the high velocity of foreign particles in the flow through the leak. This erosive effect is called wire drawing, and occurs not only when a valve leaks, but also when it is used for throttling.

It is difficult to repair a leaky gate valve by grinding or lapping the wedge and seat surfaces; that, at least, has been our experience, and we usually end up by junking the valve and installing a new one.

The bonnet of the gate valve also makes an excellent receptacle in which to collect solids and may in time become so thoroughly filled that the valve cannot be closed.

Another source of trouble is the valve gland. Frequently there is a drip at that point. This means procuring a wrench, tightening the gland nuts until the leak stops, with the hope that the stem can still be turned. A few weeks later the same job may have to be done again. When that treatment ceases to stop the leak, it means a re-packing job.

A gate valve is not as compact as a plug valve and the stem is quite likely to be bent by an accidental blow. Gate valves, however, will generally perform the function required of them with ordinary care, if it is not necessary that they be absolutely tight, with no leakage around gate or stem, and if operation is relatively infrequent. This makes them particularly good for shut-off valves that are in remote locations and seldom used.

Plug Valve Operation

Lubricated plug valves are easy to operate, if properly maintained, and require only one-quarter turn for complete movement to open or close. The motion is limited by stops and the mark cast in the shank of the plug shows the position of the opening at a glance.

The port opening of the make of valve that we use at Hartford gives full pipe area for the flow, and there is small loss in head as the contours of the passages through the valves are streamlined and have no sharp projections in the line of flow.

The seating surfaces are not exposed to wear when the valve is fully open and, when closed, the lubricant serves to protect the plug from corrosion.

The valves are compact, with little that can be damaged by external blows, have few parts and are easy to take apart if necessary.

Since the valve depends on lubricant for easy operation, tight seal, and protection of the machined surfaces from corrosion and wear, it is extremely important that it be kept filled at all times with the proper grade of lubricant. The sticks of lubricant used in the valves are generally suitable for use over a wide range of temperatures so that operation at low temperatures requires more strength than when the valves are warm. At Hartford, the lubricant used is good for a temperature range of +10° to 160° F. and is found satisfactory except on water valves operating at 110 lbs. pressure, and on the circulating hot water lines where a slightly more viscous grease is necessary. If high temperature lubricant is used in a valve, and it becomes necessary to operate it at a low temperature, it is practically immovable and has to be warmed before the plug can be turned.

Due to the rotation and shearing action of the plug, any solids in the valve, unless they are too large or too hard, will be cut, thus permitting a tight closure. This is particularly advantageous on sludge and scum lines which frequently carry rags and other solid material.

Some lubricated plug valves in the digestion gallery piping were very badly stuck in the closed position. They had been closed after carrying warm, partially digested sludge, and the small amount of it that was trapped inside the plug kept right on digesting so that the gas developed sufficient pressure to make the plug practically inoperative. A six-foot piece of pipe was fitted over the wrench handle and, aided by three husky men on the end of the pipe, we managed to move the plug enough to release the gas. The moment the gas escaped, the valve could be moved with ease. We found that this trouble was easy to overcome by installing a ⅛-in. pet-cock in the valve cap. Then, if the valve sticks, the pet-cock is opened for a moment to relieve the gas pressure and the valve will open easily.

The only maintenance needed for cylindrical plug type valves is lubrication. If the valve starts to leak at the shank, one knows that it needs a stick of lubricant; and if it begins to turn with very little resistance, again lubricant is required, for that little 0.003 to 0.005-in. clearance space is not full of grease when the plug turns too easily.

In Summary

It is the author's belief that gate valves are best for isolated locations, where they are seldom operated, where there is little or no maintenance, where no throttling service is required, and where an absolutely tight closure is not necessary.

Lubricated plug valves have their field where operation is frequent, where proper supervision and maintenance are available, for sludge lines, or where solids are present in the fluid, where throttling is desirable (diamond or "V" port plugs will give better control), and finally, where tight closures are necessary.

This discussion has attempted to point out some of the good and bad features of two kinds of valves that are radically different in design, with particular reference to the viewpoint of the man who has to operate and maintain them.

P-141 Order to End Sept. 30

Elsewhere in this same issue is an announcement of the cancellation of the existing "U" orders of W.P.B. as of Sept. 30th. On Sept. 7th W.P.B. announced that the P-141 order for sewerage, which is the counterpart of the "U-1" order for water works, is likewise to terminate on Sept. 30th.

As in the case of water supply there will be only the "C.C." and "M.M." ratings—the M.M. applying strictly to military orders, whereas the C.C. rating is only to be applied to civilian orders (by W.P.B. proper) to secure needed materials or equipment in an emergency and also to speed up deliveries where necessary. Also, like the new priorities for water works, there is an "AAA" rating for sewerage which is to be used only in rare instances—for example, the Manhattan Project which developed the Atomic bomb has always benefited from the "AAA" rating.

With the passing of the "U" orders and the death of P-141 on Sept. 30, 1945, all orders in the manufacturers' hands will automatically become unrated as of Sept. 30th unless a "C.C." rating is applied for and granted.

Gannett & Associates Open New York Offices

Gannett, Fleming, Corddry and Carpenter, Engineers of Harrisburg, Pa., have opened a New York office at 50 Broad St.

Mr. George F. Axt, a graduate of Pratt Institute, and former graduate student at Harvard University in Architecture, has become associated with the firm and will have charge of the New York office. Mr. Axt was a member of the faculty of Pratt Institute in New York, is a registered architect in New York and New Jersey, and a member of the American Institute of Architects.

He was Assistant Chief in charge for the Architect-Engineer, of all Technical Production and Supervision of Drafting on four Air Bases in the Caribbean Area. On the Andrews Field Airport in Maryland, near Washington, D. C., he was Assistant Project Manager for Gannett, Fleming, Corddry and Carpenter.

National Institute of Health Research Fellowships

The Public Health Service announces the creation of National Institute of Health research fellowships, after July 1, 1945.

The junior research fellowships will be available to those holding masters' degrees in the sciences (such as physics, chemistry, entomology, etc.) allied to public health, from an institution of recognized standing. The stipend will be $2,400 per annum.

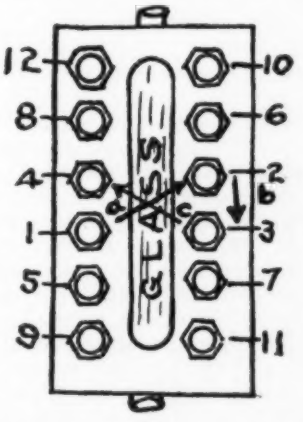
The senior research fellowships will be available to those holding a doctor's degree in one of the sciences allied to public health. The stipend will be $3,000 per annum.

These fellowships will offer an opportunity to sanitary engineers, chemists, bacteriologists, biologists, and others, for study and research at the Institute or some other institution of higher learning, in association with highly trained specialists in the candidate's chosen field.

Letters of inquiry should be addressed to The Director, National Institute of Health, Bethesda 14, Md.

How to Bolt a Modern Gage Glass*

This diagram shows the writer's tested "system" for tightening the bolts on modern gage glasses of the type that are being used more and more these days. The method is such that the pressure exerted by the bolts becomes equally distributed gradually, with the least danger of cracking the glass. The thing to do is to begin at the center and work outward as shown by the numbers on the sketch.



Starting with 1, apply the following routine or sequence repeatedly:

Diagonally upward to 2; then straight down to 3; diagonally upward to 4; then straight down to 5; and so forth. Get the idea?

*Contributed by W. F. Schaphorst, M.E., Newark, N. J.

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

Apparatus for Underground Water Storage. Ross Nebolsine, Seacliff, N. Y. U. S. 2,375,865; May 15, 1945; (Appl. 2-11-41). An apparatus for the collection and storage of underground water comprising a chamber sunk to the water bearing strata, lateral passageways into the porous water bearing formation, said lateral passageways connected to vertical risers connected to a conduit, with valves for regulating whether water from any particular passageway goes to the collecting header at ground level or to the sunken storage chamber.

Centrifugal Pump. Fred Miess, Gary, Ind. U. S. 2,376,071; May 15, 1945; (Appl. 8-27-40).

Method and Apparatus for Treating Water. Ames, Iowa. U. S. 2,376,543; May 22, 1945; (Appl. 9-22-41). A method of treating water to remove iron salts by oxidizing the soluble iron salts into insoluble iron salts, then filtering through a layer of inert material and a layer of water softening material, and bypassing some of the filtered water around the softening section and mixing the filtered with the softened water. The whole is housed in a metal tank.

Water Treating Composition and Method of Producing the Same. Frederick E. Sherwood (to National Aluminate Corp., Chicago). U. S. 2,376,885; May 29, 1945; (Appl. 9-25-41). Process of converting farinaceous material into a water softening material by mixing one part of dry starch with 0.6 part of a 40 per cent aqueous solution of NaOH, and then adding water soluble binding material to produce a dry mass with the water contained therein.

Preparation of Carbonaceous Base Exchange Material. Abraham Sidney Behrman (to Infilco, Inc., Chicago) U. S. 2,376,896; May 29, 1945; (Appl. 8-13-42). Method of preparing a carbonaceous base exchange material comprising treating the material with an acid to partially sulfonate the material until reaction substantially ceases, and then adding more acid to substantially complete the sulfonation of the carbonaceous material.

Liquid Treatment. Abraham Sidney Behrman and Hilding B. Gustafson (to Infilco, Inc., Chicago) U. S. 2,376,897; May 29, 1945; (Appl. 9-11-39). A process for treating water by subjecting it successively to hydrogen exchange treatment and passing it over magnesium oxide or hydroxide, thereby producing magnesium carbonate, then treating the water with a hydroxide to precipitate the magnesium as the hydroxide, and separating the $Mg(OH)_2$.

Chlorine Dioxide Manufacture. Sven Helmer Persson (to Aktiebolaget Duba, Stockholm, Sweden) U. S. 2,376,935; May 29, 1945; (Appl. 1-10-44). A process for preparing chlorine dioxide by reducing chlorates in an aqueous solution with a reducing agent, using a recycling system employing two reducing agents of specified oxidation-reduction potentials.

These patent abstracts being brief do not necessarily cover the entire scope of the invention described. If the reader becomes especially interested in any of these patents he should obtain printed copies of the complete patent, at 10 cents each, from the Commissioner of Patents, Washington 25, D. C.

Activated Carbon and Method of Producing Same. Rudolf Adler, Montreal, Quebec, Canada. U. S. 2,377,063; May 29, 1945; (Appl. 7-21-41). A process of distillation and activation.

Liquid Treatment. John J. Felsecker (to Graver Tank Co., Chicago, Ill.). U. S. 2,377,545; June 5, 1945; (Appl. 7-6-42). Apparatus for water treatment consisting of a tank, an annular concentric baffle wall, with means for introducing water for treatment into the annular space, passing it downward, and then upward in a center space where flocculation and settlement occurs with sludge being removed from the bottom.

Filter Bottom. John P. Myron (to F. B. Leopold Co., Inc. U. S. 2,378,240; June 12, 1945; (Appl. 12-5-42). A supporting base with unitary fluid duct comprising a plurality of spaced rows of perforated filter blocks.

Water Treating Apparatus. Joseph F. Sebald (to Worthington Pump and Machinery Corp., Harrison, N. J.). U. S. 2,378,799; June 19, 1945; (Appl. 3-12-42). Apparatus for softening water by introduction of water and softening chemicals into bottom of tank with passage of water upward through precipitated sludge and upward through settling zone. Sludge is removed from bottom to maintain constant level of precipitated floc.

Water Purifying and Degasifying Apparatus. Joseph F. Sebald (to Worthington Pump and Machinery Corp., Harrison, N. J.). U. S. 2,379,753; July 3, 1945; (Appl. 7-9-42). A method which consists of spraying raw water through a steam containing space to partially heat the water, then spraying treatment chemicals in finely divided streams into steam containing space with treated water in reaction space below. Means for removing sludge.

Flowmeter. Harry J. Bowie (to Fischer & Porter Co., Hatboro, Pa.). U. S. 2,380,399; July 31, 1945; (Appl. 6-10-43). A flow meter of the rotameter type for remote indication.

Method and Apparatus for Regulating the Head and Capacity of Centrifugal Pumps. Lewis F. Moody. U. S. 2,380,606; July 31, 1945; (Appl. 12-19-42).

Water Treatment. Howard V. Smith and Margaret C. Smith, Tuscon, Ariz. U. S. 2,380,800; July 31, 1945; (Appl. 5-20-39). Process for removing fluorine from water by passing the water through a defluorinated bone contact filter. Apparently intended for small installations and office type water coolers.

Diaphragm Valve. Oystein Jacobsen (to The Duriron Co., Dayton, Ohio). U. S. 2,381,544; Aug. 7, 1945; (Appl. 10-4-43).

Filter. Lonnie L. Thompson, Iowa Park, Texas. U. S. 2,381,627; Aug. 7, 1945; (Appl. 9-29-42). A cylindrical tank with cartridge type filter.

Dry Chemical Feeder. George Martin Booth and John Scott Ballard (to Wallace and Tiernan, Inc., Newark, N. J.). U. S. 2,381,802; August 7, 1945; (Appl. 10-23-41). Apparatus for dry feeding chemicals. having a feed hopper with opposite, inwardly, downwardly sloping walls with diaphragm walls at bottom, said walls being movable with oscillation to cause chemical to feed downward at rate determined by rate of oscillation.

Method and Apparatus for Treating Water. Joseph P. Lawler, Ames, Iowa. U. S. 2,382,490; Aug. 14, 1945; (Appl. 12-22-39). An upflow flocculation chamber with rotating paddles and water treatment chemicals introduced at the bottom, followed by an upflow sedimentation chamber with the water passing through the settling sludge which is drawn off at the bottom while the treated water is drawn off at the top. (See also Lawler patent 2,376,543—May 22, 1945—reported also in this digest.)

Electrical Determination of Control of Chlorine in Liquids. Henry Clay Marks (to Wallace and Tiernan, Inc., Newark, N. J.) U. S. 2,382,734; Aug. 14, 1945; (Appl. 12-28-40). A method for continuously determining the concentration of available chlorine in an aqueous liquid by passing the liquid through a device for measuring a potential of the chlorinated liquid.

Boiler Feed-Water Treatment. Thomas L. Pankey and Carroll E. Imhoff (to Allis Chalmers Mfg. Co., Milwaukee, Wis.) U. S. 2,382,902; Aug. 14, 1945 (Appl. 5-7-41). Method of treatment to remove dissolved silica.

Water Treating Apparatus. Joseph F. Sebald (to Worthington Pump and Machinery Corp., Harrison, N. J.). U. S. 2,383,086; Aug. 21, 1945; (Appl. 7-9-42). An upflow water softening apparatus.

Solar Water Still. William Speight Barnes, Tuscon, Ariz. U. S. 2,383,234; Aug. 21, 1945; (Appl. 4-29-42).

Chemical Feeding Pump. John F. Singleton, Van, Tex. U. S. 2,383,422; Aug. 21, 1945; (Appl. 2-23-44).

SEWAGE PATENTS

Purification of Liquids. Robert F. Clemens (to the Dorr Co., New York). U. S. 2,375,282; May 8, 1945; (Appl. 12-20-41). An apparatus for separating suspended particles from liquid, comprising a closed tank with a slight vacuum above the liquid, means for introducing sewage into tank, and overflow means with necessary appurtenances and apparatus to circulate liquid to keep changing surface in contact with overlying gas, and to remove solids, etc.

Comminutor Base Seal. John J. Wirts (to Chicago Pump Co., Chicago). U. S. 2,375,455; May 8, 1945; (Appl. 8-16-43). An improved modification of a sewage comminutor, for cutting screenings as sewage passes through the apparatus.

Continuous Industrial Filter. Carroll M. Stanley (to Oliver United Filters, Inc., Oakland, Calif.) U. S. 2,377,189; May 29, 1945; (Appl. 10-5-43). A device for puddling the cake formed and carried on an endless travelling filtering medium, with a panel which can be vibrated at right angles to the direction of rotation thereby bringing the panel in contact with the cake.

Compound Clarifier. William E. Geissler (to the Dorr Co.) U. S. 2,377,875; June 12, 1945; (Appl. 12-1-41). Multitray clarifier with plurality of clarifying compartments and means for withdrawing both sludge and liquor from the separate compartments.

Method of Purifying Oil Field Waste Waters. Richard D. Pomeroy (to Santa Fe Springs Waste Disposal Corp.) U. S. 2,378,323; June 12, 1945; (Appl. 1-20-44). A method of removing emulsified and adsorbed petroleum particles from saline oil-field waters by coagulation using sodium silicate, specially prepared, in combination with iron or aluminum coagulants.

Septic Tank. Neal J. Burgett (to B & E Art Metals, Inc., Detroit, Mich.) U. S. 2,378,616; June 19, 1945; (Appl. 4-20-42). A septic tank of separately formed top bottom, and sides formed of molded cementitious materials and adapted to inter-engage with each other.

Sewage Treatment. Augustus C. Durdin, III, Niles Center, Ill. U. S. 2,378,-756; June 19, 1945; (Appl. 8-3-40). A classifier or clarifier tank with central zone into which sewage is discharged tangentially, followed by downward flow into larger concentric space wherein flow is upward and out over a periferal weir. Solids settle to the bottom and are scraped to the center for removal.

Comminuting Method and Apparatus. Augustus C. Durdin, III, Skokie, Ill. U. S. 2,378,757; June 19, 1945; (Appl. 12-22-41). A rotating screen on horizontal axis, with material caught on upstream face of screen rotated, cut off, and flushed away by flow from downstream side of cylinder.

Method of Treating Sewage. Richard G. Tyler. U. S. 2,379,554; July 3, 1945; (Appl. 10-1-41). A method for bubbling air upward through a water course into which sewage or wastes have been discharged, thereby replenishing the dissolved oxygen as decomposition occurs.

Sewage Screening Apparatus. James D. Walker (to The American Well Works, Aurora, Ill.). U. S. 2,379,615; July 3, 1945; (Appl. 12-4-43). A screen with the rake approaching from the back side, carrying the screenings downward into a sump from which they are removed, ground, and returned to the upstream side of the screen.

Sewage Treatment System. Corson W. Chase (to Chicago Pump Co., Inc., Chicago, Ill.). U. S. 2,380,025; July 10, 1945; (Appl. 6-22-42). A comminutor which is arranged to split the flow of sewage into substantially grit free liquid before passing through the cutting zone and into a portion containing the grit which is washed.

Treatment of Paper Machine Waste Water. George A. McBride (to Infilco, Inc., Chicago, Ill.). U. S. 2,380,252; July 10, 1945; (Appl. 10-31-42). A process for mechanically removing fibers from a suspension thereof, in an upflow tank in which the fibers are flocculated out as they pass upward through the settled sludge. No chemicals are used.

System of Aeration. Chester F. Proudman, New Canaan, Conn. U. S. 2,380,-465; July 31, 1945; (Appl. 2-14-39). A primary effluent channel, a series of closed aeration tanks operating on the batch aeration principle, with the effluent from one tank going to the next and means for recirculating the activated sludge.

Sewage Treating Apparatus. Augustus C. Durdin, III, Skokie, Ill. U. S. 2,381,579; Aug. 7, 1945; (Appl. 1-12-42). Substantially a packaged aeration plant, with aerating chambers, and settling chambers, et al.

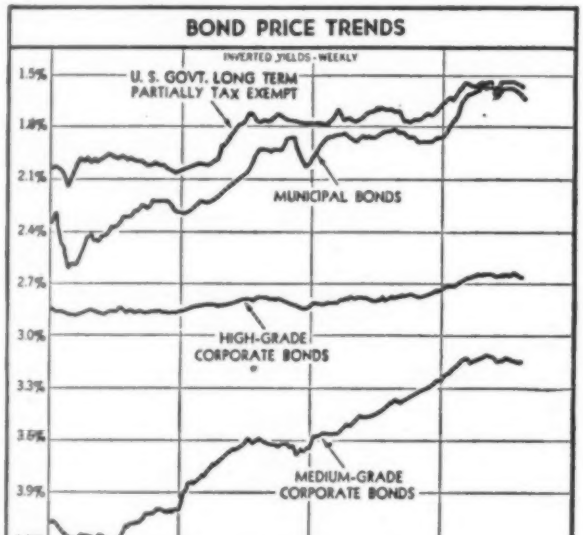
The Editor's Comments

Why Should Municipalities Look for Federal Aid?

At this time there is considerable talk about the need for again instituting financial aid to municipalities by the Federal Government for the purpose of stimulating a program of public works construction on a National scale. The question is: does it make sense?

As we look at it, there was a time in the depression of the 1930's when financial aid by the Federal Government to municipalities was justified. The credit of municipalities was at a very low ebb and local taxes—yes, even water service charges—were in many instances almost impossible to collect. The banks were not looking with any favor whatever on municipal securities. All in all, money matters were tough, interest rates were very high, and bonds of cities were unpopular. Federal assistance was then a real need, but there is scant comparison between the situation then and in this year 1945.

As evidence in support of this contention we reproduce a recent graph which records an interesting fact—namely, that at present money costs our cities little if any more than it does the Federal Treasury to borrow.


BOND PRICE TRENDS
INVERTED YIELDS - WEEKLY
U. S. GOVT. LONG TERM PARTIALLY TAX EXEMPT
MUNICIPAL BONDS
HIGH-GRADE CORPORATE BONDS
MEDIUM-GRADE CORPORATE BONDS
1.5%
1.8%
2.1%
2.4%
2.7%
3.0%
3.3%
3.6%
3.9%
4.2%
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1942
1943
1944
1945
SOURCE: STANDARD & POOR'S CORP.

The general average of bonds of cities are selling now to yield about 1.6 per cent, and for the first time in history, perhaps, U. S. Treasury bonds yield practically the same. This is ample proof that financial institutions are as anxious to loan to municipalities direct as they are to the Federal Government. What could be a healthier indication of the ability of cities to pay for what they need, and a reflection of their long term credit status. As a matter of fact, this picture cannot but help indicate what is generally known—namely, that cities for the most part have accumulated sizable (probably record establishing) surpluses in their treasuries.

In this connection, it was not long ago that Baltimore, Md., sold a $5,000,000 issue of water and sewer bonds to a local syndicate of bankers at a cost to the city of but ⅞th of 1 per cent for money borrowed until 1960.

While we would not wish to say that there cannot be cited instances wherein some municipalities have come through the war period as sufferers in the way of depleted financial reserves, these must be exceptionally few. Such communities may deserve some Federal aid in order to benefit from needed improved water supply and sanitation facilities. Therefore, one cannot make a blanket statement that there should be absolutely no Federal aid to any community, because some may actually deserve it. However, we believe that very real justification for it should be proved before the tax funds of the National citizenry should be tapped for such relief.

Many of our cities are still holding back on developing ready-to-go plans for improved water supply and sewerage facilities, with the feeling that some sort of Federal aid will sooner or later become available. Many others are taking advantage of funds made available by some states and the Federal Works Agency for securing the necessary engineering and the development of ready-to-go plans for public works construction. However, it is understood that the borrowed funds used for such preparations are only to be paid back should the projects planned be carried through. How much of this planning is to go through in case there will be no Federal grants to municipalities cannot be predicted. We do know this though, that many municipal officials are fearful that if local financing of post-war public works projects is proceeded with now and Federal aid becomes available later, they will face much criticism from the local taxpayers for not having held back until the free money became available.

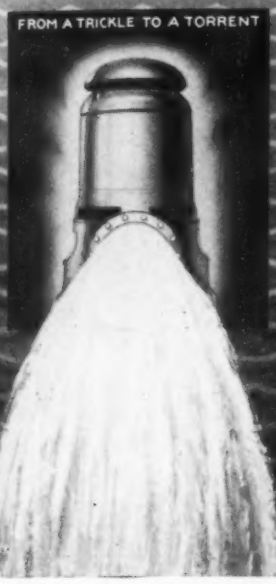
Of course, it is just an illusion that these Federal grants cost the recipient municipality nothing. But, as someone has well put it, it seems to have become a "hardy illusion" fostered by Washington for years, and a great many people still want to believe in it.

Truth of the matter is that it costs considerably more to finance local improvements through the Federal Government than it does through local agencies. As the accompanying graph reveals, the money borrowed costs the Federal Government essentially the same as it costs the municipality, but when the Government borrows it and then distributes it there are many additional expenses entailed, both to the Government and to the municipality receiving the grant.

When one considers that it is a fact that the Federal Government has come out of the war debt-loaded and problem-ridden, while the cities have come through in better financial condition today than perhaps ever before, it seems grossly unreasonable to expect to put the Federal Government still deeper in debt just in order that some "free" money might be secured for local improvements which the city is well able to pay for.

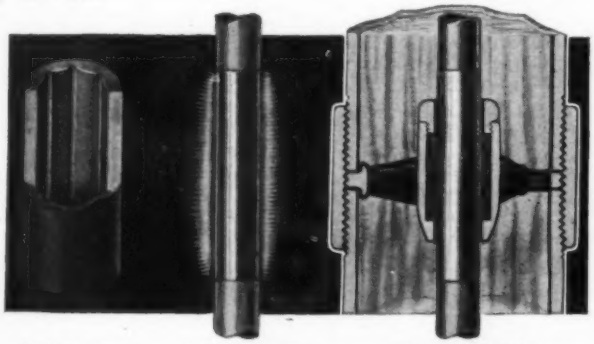
L. H. Enslow

Peerless Pumps



From Deep Wells
15 to 30,000 gallons per minute

In Peerless Turbine Pumps you will find many exclusive features—for instance: (1) improved method of cooling motor bearing lubricant; (2) ingenious packing arrangement; (3) enduring shaft bearing contacts; (4) Double Seal under each impeller to withstand abrasive action of sand in the water.



Resilient Sleeve *Chrome Bearing* *The Perfect Bearing*

Above is illustrated the famous Peerless shaft bearing for water-lubricated turbine pumps—the closest approach to an indestructible bearing. A chrome protected sleeve fits the shaft and rotates within a Goodrich Cutless resilient sleeve. Unaffected by abrasives in the water. No oil required below the surface.

Peerless Distributors and Direct Factory Representatives are located in every State. Ask for name of Distributor nearest you.

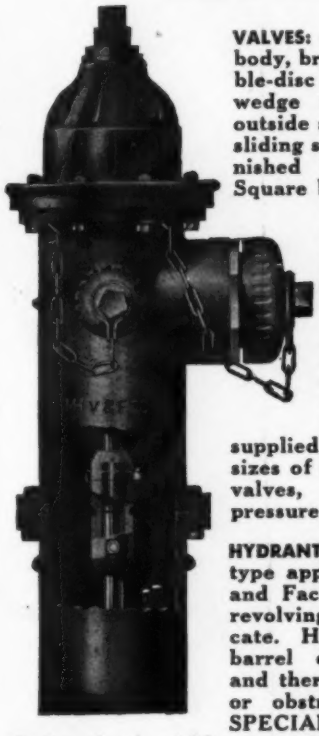
PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corp.

FACTORIES
LOS ANGELES 31, CALIFORNIA
301 West Avenue Twenty-six
QUINCY, ILL. • CANTON 6, OHIO

Dependable! Rugged!

VALVES HYDRANTS



VALVES: A.W.W.A. type, iron body, bronze mounted with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square bottom type operates in any position. All rugged and dependable, made of best material with highest quality workmanship.

Hydraulically Operated: For remote control of operation and for quicker, easier opening or closing. Can be supplied in any of the standard sizes of M & H A.W.W.A. gate valves, either high or low pressure.

HYDRANTS: Standard A.W.W.A. type approved by Underwriters and Factory Mutuals. Dry top, revolving head, easy to lubricate. High efficiency because barrel diameter not reduced and there are no working parts or obstructions in waterway. SPECIAL TRAFFIC MODEL is designed to yield at ground line under impact, repair being simply renewal of breakable bolts and breakable coupling on stem.

Write for Catalog No. 34

M & H PRODUCTS INCLUDE

FIRE HYDRANTS	SHEAR GATES
GATE VALVES	MUD VALVES
TAPPING VALVES	VALVE BOXES
WALL CASTINGS	FLAP VALVES
SPECIAL CASTINGS	SLUDGE SHOES
TAPPING SLEEVES	FLANGE AND FLARE FITTINGS
CHECK VALVES	FLANGED FITTINGS
FLOOR STANDS	B & S FITTINGS
EXTENSION STEMS	CUTTING-IN TEES

M & H VALVE AND FITTINGS COMPANY

ANNISTON, ALABAMA

Something *NEW* in Better Pipe Cutting

New Efficiency-Balanced RIDGID CUTTER

with fast-action, thin-blade cutter wheel

● The instant you pick up this new RIDGID pipe cutter, with its rugged new style malleable frame, you like the feel of it, the efficient balance—and it cuts pipe with the easy speed that feeling suggests. True clean cuts, almost without burr, the thin tool-steel blade wheel rolling right through with least effort. Make your next cutter a new RIDGID—ask your Supply House. We're doing our best to keep it supplied.

You'll like this No. 42 4-wheel cutter, too — fast quarter turn cutting.

RIDGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U. S. A.

MEETINGS SCHEDULED

Sept. 18—DULUTH, MINN.
Minnesota Section A.W.W.A. Sec'y, R. M. Finch, 416 Flour Exchange, Minneapolis, Minn.

Sept. 19-20—GRAND RAPIDS, MICH. (Pantlind Hotel)
Michigan Section A.W.W.A. Sec'y-Treas., R. J. Faust, Chief, Div. of Water, State Dept. of Health, Lansing, Mich.

Sept. 21—DENVER, COLO. (Shirley-Savoy Hotel)
Rocky Mountain Section A.W.W.A. Sec'y, O. J. Ripple, 517 Majestic Bldg., Denver 2, Colo.

Sept. 22—CLEMENTON, N. J. (Silver Lake Inn)
New Jersey Sewage Works Association. Sec'y, Edward P. Molitor, 327 Morris Ave., Springfield, N. J.

Oct. 5—(Tentative) NORRISTOWN, PA. (Inn near Norristown)
Four States Section. (Philadelphia Area Meeting.) Sec'y, H. Lloyd Nelson, 1624 Lincoln-Liberty Bldg., Philadelphia, Pa.

Oct. 6—PAINTED POST, N. Y.
Tri-County Water Association (Semi-Annual Meeting). Chairman, E. J. Rowe, 110 Maple Ave., Wellsville, N. Y.

Oct. 10—BATH, ME.
Maine Water Utilities Association. Sec'y, Earle A. Tarr, Sup't, Water District, Winthrop, Me.

Oct. 16-17—SHREVEPORT, LA. (Washington-Youree Hotel)
Southwest Section A.W.W.A. Sec'y-Treas., L. A. Jackson, Gen'l Mgr., Water Dept., Little Rock, Ark.

Oct. 17-18—CHICAGO, ILL. (Stevens Hotel)
Federation Sewage Works Assn. (Board of Control Meeting.) Exec. Sec'y, W. H. Wisely, 325 Illinois Bldg., Champaign, Ill.

Oct. 22-23—PITTSBURGH, PA. (Hotel Wm. Penn)
Engineers' Society of Western Pennsylvania. Chairman, H. M. Olson, 171 Longue Vue Drive, Mt. Lebanon, Pa.

Oct. 23—LOS ANGELES, CALIF.
and
Oct. 25—SAN FRANCISCO, CALIF.
California Section A.W.W.A. Sec'y-Treas., B. I. Burnson, Box 720, Oakland 4, Calif.

Oct. 23-26 incl.—(Ohio Regional Meetings)—FINDLAY, 23rd; WILMINGTON, 24th; ATHENS, 25th; MASSILLON, 26th.
Ohio Section A.W.W.A. Sec'y, L. J. Hoffman, 101 Municipal Bldg., Akron, O.

Oct. 30-31—CHICAGO, ILL. (LaSalle Hotel)
Illinois Section A.W.W.A. Sec'y, O. T. Birkness, 1229 Washington Blvd., Chicago, Ill.

Nov. 5-6—WINDSOR, ONT. (Hotel Prince Edward)
Canadian Institute on Sewage & Sanitation. Sec'y-Treas., Albert B. Berry, Ont. Dept. of Health, Parliament Bldg., Toronto, Ont., Can.

Nov. 5-7—CHARLOTTE, N. C. (Hotel Charlotte)
North Carolina Section A.W.W.A. Sec'y, D. M. Williams, Supt. of Water & Sewerage, Durham, N. C.

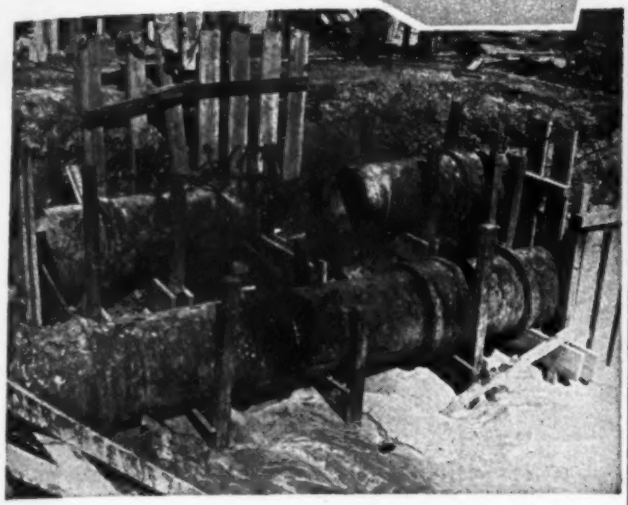
Nov. 8-9—ROANOKE, VA. (Hotel Roanoke)
Virginia Section A.W.W.A. Sec'y-Treas., W. H. Shewbridge, State Health Dept., 1506 Greycourt Ave., Richmond 22, Va.

Nov. 9—ATLANTIC CITY, N. J. (Hotel Madison)
New Jersey Section A.W.W.A. (Fall Meeting.) Sec'y, C. B. Tygert, Box 178, Newark, N. J.
(Joint Meeting with)
South Jersey Association of Water Superintendents. Sec'y, Walter Spencer, 2707 Bethel Ave., Merchantville, N. J.

"C" VALUE

Reduced to 1/5

"C" VALUE



RESTORED IN FULL BY FLEXIBLE

ONE OF AMERICA'S largest oil refineries forgot this 30" pipe line until its "C" value was reduced from its original 132 to 24. How long this capacity has been reduced we do not know. But, we do know that its original capacity has been restored in full . . . that pumping costs are down while volume pumped is up each in proportion . . . and the costs for cleaning were infinitesimal in comparison to the wasted power or the cost of replacing the pipe.

What is the condition of your pipe lines? Can you afford to guess? Write today! Have Flexible check your pipe lines and estimate the cost of restoring their "C" value.

FLEXIBLE UNDERGROUND PIPE-CLEANING CO.

615 Pickwick Bldg., Kansas City 6, Mo.
1624 Harmon Place, Minneapolis 3, Minn.
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Accelerate

Your
SLUDGE ACTIVATION
with
POTTSTOWN AIR BLOWERS

More air for your sewage disposal plant ...AT LESS COST

because:

Pottstown Rotary Positive Displacement Blowers require less power than other types . . . are built extra-sturdy for heavy service . . . and have no reciprocating, sliding or other friction wearing parts that require adjustments, maintenance or replacement expense. They have proven their long life and trouble-free operation in sewage plants all over the country.

WRITE TODAY FOR BULLETIN AND COMPLETE INFORMATION

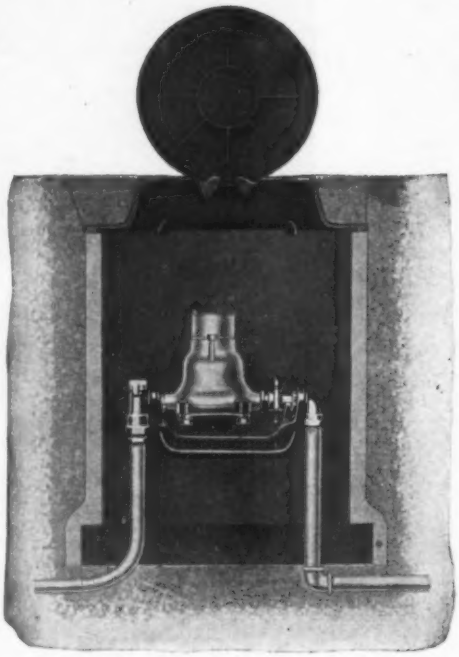
ALLEN BILLMYRE COMPANY
449 Fayette Avenue • Mamaroneck, N. Y.

AB-791

POTTSTOWN
ROTARY POSITIVE DISPLACEMENT
BLOWERS

What FORD YOKES DO

1. They make meters easily installed or removed by simply turning the handwheel of the Expansion Connection.
2. They hold inlet and outlet piping permanently connected, preventing leaks and other difficulties which frequently result from physically disconnecting or disturbing service lines during meter changes.
3. By making meter changes easier and trouble-free, they permit and induce better care of meters, more frequent testing, therefore, more revenue.
4. Ford Yokes permit the use of meter boxes with smaller lids which are safer, more frost-proof and more sightly.
5. They prevent unauthorized connection of the service or stealing of water.
6. The valve type offers a saving of the ordinary curb valve and valve box.



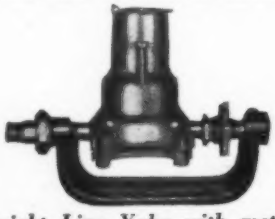
A No. 509 Yoke with a copper inlet and iron pipe outlet in service in a meter setting made up of a bell end tile and a Type X Cover. Note permanent connection of risers and convenience of valve.

How FORD YOKES WORK

The Expansion Connection is part of every Ford Yoke. It is screwed onto one spud of the meter and may then be expanded or contracted to install or remove it from between the rubber gaskets in the Yoke saddles.

Ford Yokes are made in several styles, with and without valves, and in sizes from 5/8" to 1". All are described in our catalog, gladly sent on request.

Meter with connection attached



Staight Line Yoke with meter installed.

The

FORD METER BOX COMPANY, INC.,

WABASH, INDIANA

Here and There with Doc Symons

More Jobs for Post-war Years?

(C. E. D. says "Yes"—and it should know)

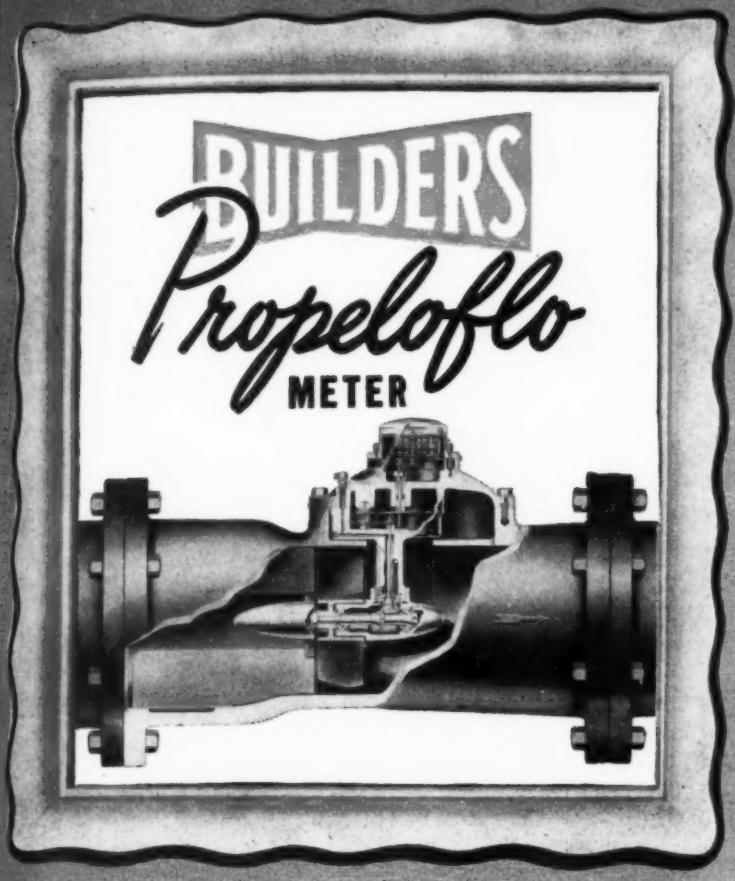
IT was a good many months ago at a meeting of the N. Y. section of AWWA where I first heard of the Committee for Economic Development (C. E. D.), but since then I've learned a great deal more about this organization, which has that fundamental idea that free enterprise and private industry can and will produce the expanding economy on which U. S. prosperity must rest.

It is interesting, therefore, to see the recent issue of a report representing 18 months' study of the job situation after the war. For this job, C. E. D.'s T. G. MacGowan headed the Marketing Committee, which first had to weed, from the present labor force of 51.3 million, the youngsters who should return to school, the women who should go back to household duties, and the over-age who should be retired.

Counting on the war to be over next year, the committee set 1947 as the first full time peace year with an expected labor market of 60 million, the normal half million a year increase being offset by military casualties.

Checking the needs of industry, it was found that for an overall picture industry looked for an increase in business of 42 per cent over 1939's $56.8 billion. Then allowing for an increase in job efficiency, the committee arrived at an expected 53.5 million jobs. Allowing for 3.5 million persons to still be in the services, the committee estimated 3 million persons in the floating surplus of people with no jobs—considerably less than the normal unemployed even in our best days.

This report, which represents a great amount of careful study, is certainly hopeful, but it appears,



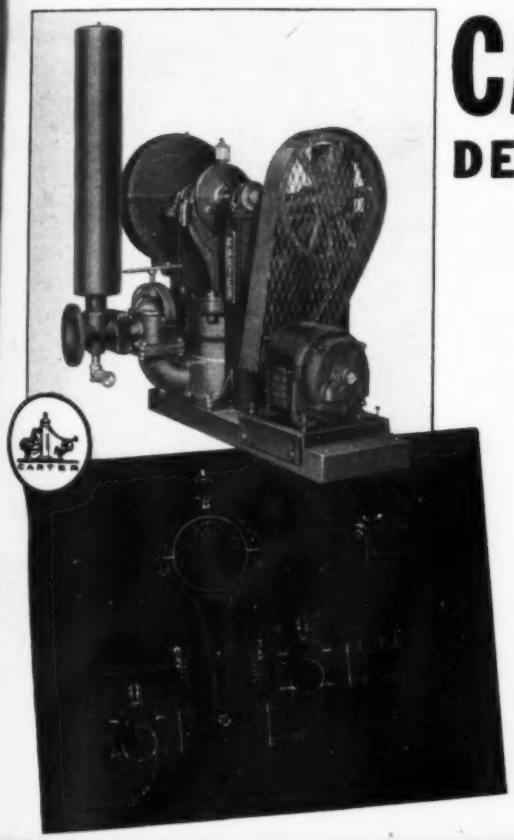
A Main Line Water Meter of Improved Design

A propeller-type flow meter by the makers of Venturi Meters, Venturi Controllers, Chronoflo Telemeters and related equipment widely used in water and sewage works.

Send for New Bulletin 350. Address Builders-Providence, Inc., (Division of Builders Iron Foundry), 10 Codding St., Providence 1, R. I.

"BLUE PRINT NOW"

Sincerely,
BUILDERS-PROVIDENCE



CARTER *SLUDGE PUMPS*
DEPENDABLE · RUGGED · MODERN

DEVELOPED by CARTER engineers for the toughest of service, the CARTER plunger sludge pump has hundreds of satisfied customers in the water, sewage and waste treatment fields. Such desirable features as variable capacity thru stroke adjustment, babbitt lined eccentrics, oversized packing glands and connecting rods of one piece construction make a CARTER sludge pump the finest that money can buy.

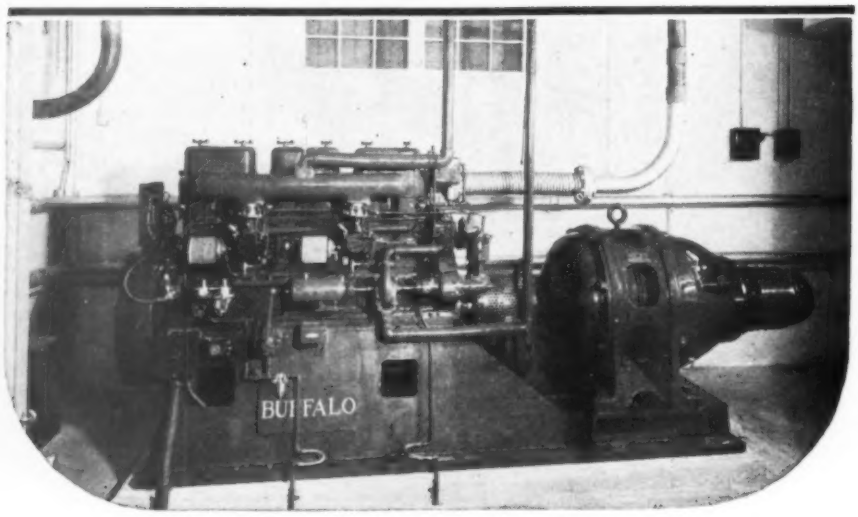
Illustration at right shows all flanged type valve chamber . . . standard construction on all CARTER sludge pumps. Chambers are provided with lead impregnated ball valves, guaranteeing a longer life on the most severe service. Quick opening covers on chambers are provided to permit ready inspection.

• ***Write for Bulletin 816***

RALPH B. CARTER CO. HACKENSACK, NEW JERSEY
53 PARK PL., NEW YORK 7, N. Y.

Quick Starting EVERY TIME

BUFFALO ENGINES — ASSURANCE of PROTECTION



Radio Station WBAL, Baltimore. An RA-6 Engine Generator Unit. Engine 6 cyls., 5¼" bore, 7" stroke, direct connected to 100 K.W., 1200 RPM Westinghouse generator. Fully automatic stop-start on failure of main source of current.

RADIO stations and fire protection systems both install emergency power equipment, but while, with good fortune, a fire system may never need stand-by power, the nature of radio means that its engines are cut in with some frequency.

It's a pleasure to hear, as we do, from radio station managers that their BUFFALO ENGINES never fail to give them power with the split-second response needed to maintain the stop-watch continuity of radio programming.

Fire, flood control, sewage works and water works have the same assurance of protection when BUFFALO ENGINES are installed. Engineers and others interested are invited to write for BUFFALO ENGINE specifications and data on the design and installation of stand-by equipment.

Send for Bulletin No. 59

BUFFALO GASOLENE MOTOR COMPANY

BUFFALO 13, N. Y., U. S. A.

BUFFALO ENGINES — ASSURANCE of PROTECTION

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P.— IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

nevertheless, that there will be quite a few persons looking to the government for jobs. And, if present legislation under consideration is passed, in all likelihood there will be developed some form of a Federal Public Works Program.

Let us fondly hope and pray that it is set up on the more sensible basis of the old PWA rather than the CWA or WPA. Let us hope, too, that our municipalities make some attempt to carry through their own public works projects rather than wait for a federal handout. And may we have one other hope, that these municipalities, to whom we have been preaching the gospel of **Blueprint Now**, get some of those plans in action—and pronto.

* * * *

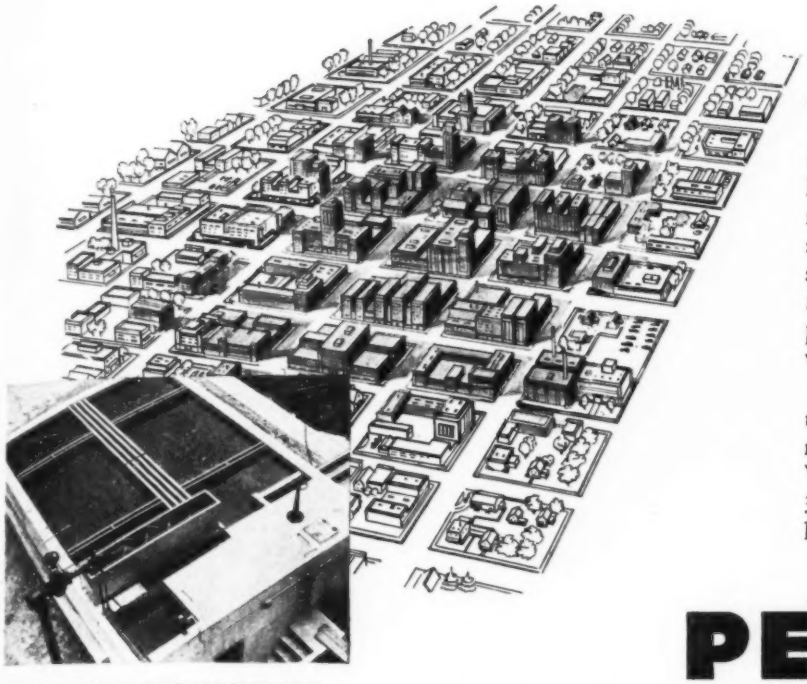
Well, what d'ya know dept. On Aug. 30th, last, one Ivan Maxwell Glace of Harrisburg, Pa., and Roy Ritter of Baltimore, Md., made an inspection of a chlorine contact tank in the sewage plant at Northampton, Pa. - - - Never a man to do things by halves or to shy at a job, Mr. Glace decided that the tank needed personal and close inspection and forthwith plunged thereinto. - - - Although the tank was dewatered (or desewaged, as the case may be), it was not *debaffled*, according to Mr. Glace's observations, and while it is reliably reported that the tank suffered no damage in the encounter, not so Mr. Glace, who has two fractured ribs and several yards of adhesive tape to remind him of the precipitous descent.

* * * *

Nothing New Under the Sun!—It just goes to show you, "There's nothing new under the sun!" In the July issue, on page 230, in the report on the NYSSWA section meetings, it was stated that as a means of cutting down on the volume of sludge, while not reducing the weight of solids removed, at the Syracuse, N. Y., activated sludge plant "a new treatment was used." This treatment consisted of plain aeration to produce flocculation without recirculation of sludge—what is apparently a form of simple bio-flocculation.

Hardly had this particular issue "hit the local newsstands throughout the country," than we had a letter from Cecil Calvert of the Indianapolis Water Co. calling attention to the poor choice of words when the treatment was described as *new*. Plain aeration in an activated sludge plant, i.e., aeration of the sewage

How growing cities can increase water-softening capacity in existing land space...



PERMUTIT SPAULDING PRECIPITATOR removes water hardness, dirt and color by the sludge blanket process. Takes only half the space of former methods.

You don't need extra water-works property to increase a city's water softening capacity. Permutit's* Spaulding Precipitator, which removes water hardness, dirt and color by the sludge blanket process, takes only half the space of former methods. But even with its reduced space requirements, the Precipitator provides greater economy of operation than was previously possible.

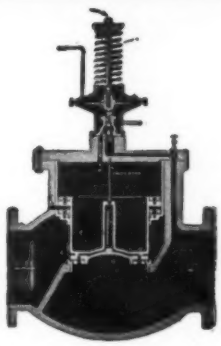
Investigate Permutit's economy of space and time in planning new equipment to meet the needs of a growing community for soft water. Write to The Permutit Company, Dept. G1, 330 West 42nd Street, New York 18, N. Y. or Permutit Co. of Canada, Ltd., Montreal.

*Trademark Reg. U. S. Pat. Off.

PERMUTIT

WATER CONDITIONING HEADQUARTERS

Stop Check Single Acting Altitude Valve



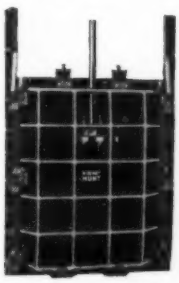
This valve installed in the upstream line automatically maintains a uniform water level within 3" to 12" variation to prevent any tank overflow; also, by means of the internal "stop check" piston assembly, prevents loss or return of storage water back through the valve—making the valve very desirable for use where metered water is purchased, or wherever it is imperative that there be no possible return flow.

This valve may be fitted with "Differential" Control for delayed opening, if desired.

Write for specifications and prices.

GOLDEN-ANDERSON VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

RODNEY HUNT



GATES and HOISTS

Metal or timber sluice gates of all sizes and designs, approved by engineers everywhere. Improved gate stands and hoists for hand or motor operation. Also flap and mud valves, shear and filler gates, trash racks and rakes. Dependable canal equipment from dam to tail-race since 1840.

Write for Special Catalog Today!

RODNEY HUNT

RODNEY HUNT MACHINE CO.
118 Lake St., Orange, Mass., U. S. A.

LEADITE

The Pioneer Self-Caulking Material for C.I. Pipe

4 REASONS why more miles of cast iron water mains are jointed with LEADITE than with any other melted self-caulking material:

- MELTS EASILY
- GOES FARTHER
- SAVES TIME, LABOR, COST OF MATERIAL
- MAKES A GOOD TIGHT JOINT THAT IMPROVES WITH AGE !

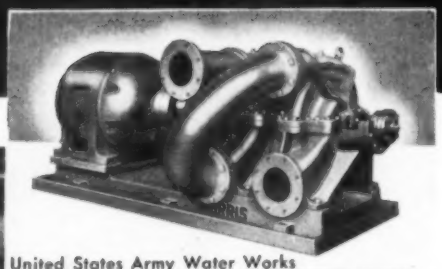
THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

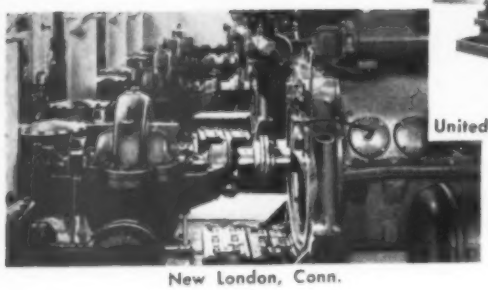
• LOW POWER COSTS

• LOW MAINTENANCE & REPAIR COSTS

Sustained Quietness and Efficiency



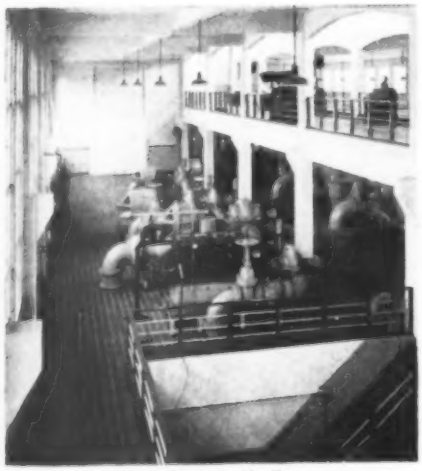
United States Army Water Works



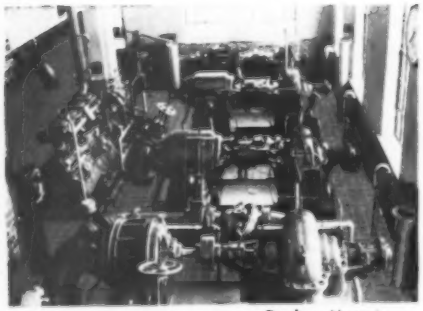
New London, Conn.

That's Why So Many Municipal Water Plants *Specify*

MORRIS CENTRIFUGAL PUMPS



Wilmington, N. C.



Rocky Mount, N. C.

Rugged in construction . . . with design stresses low for smooth, trouble-free operation . . . MORRIS CENTRIFUGAL PUMPS run quietly and uninterruptedly over long periods of continuous operation. Sustained high efficiency—the result of correctly related impeller and casing designs plus Morris' quality construction—keeps power consumption down. Service and repair costs per million gallons are held to a few cents. Daily experience over a period of years confirms the wisdom of selecting MORRIS equipment.

Consult our engineers now regarding your particular needs. There's a MORRIS pump for every job, and more than three-quarters of a century of pump-building "know how" behind every MORRIS pump.

MORRIS MACHINE WORKS
BALDWINSVILLE, N. Y.
Branch Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

without sludge recirculation, had been practiced in Indianapolis as far back as 1931.

In looking into the matter I find that Hatfield used and reported on the same treatment at Decatur, where aeration was employed to reduce trickling filter loadings. According to Dr. Hatfield, the idea had been tried on a laboratory scale in England as early as 1882, and was also studied in the laboratory in America by Phelps in 1910-12, and so forth. Of course, if one doesn't count Hatfield's plant as an activated sludge plant (it is partial activation or pre-aeration before trickling filters) then Indianapolis appears to have been the first activated sludge plant that eliminated return sludge and used plain air flocculation, but we expect a letter any day now naming some other plant. Just goes to show that no matter what idea you have for treating sewage—someone had it before you did. Anyway, it was new to Syracuse. The interesting thing is that results at all three of the plants were similar. The idea would seem to merit further investigation.

* * * *

Why doesn't somebody tell me these things? Seems as though I have to learn all the spot news second hand. F'rinstance, "Jo" Quinn didn't write to tell me that he has resigned as Act. Dir. of the Bureau of Environmental Sanitation, of the Indiana State Dep't. of Health. Rumor has it that Jo is now in some sort of real estate promotional work in Terre Haute.—You couldn't get Jo out of the State and I'll bet he'll still be around the water works conventions—they won't seem the same without him.

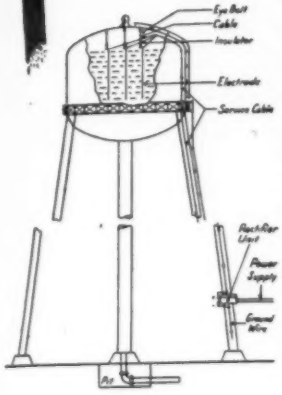
* * * *

Mr. Clinton L. Bogert, Cons. Engr. of N. Y., with whom Homer Wisely and I carry on a heavy correspondence, is working on the new glossary of water works and sewage works terms and is ever alert to new problems that might have a bearing on this work.

After reading Wendell LaDue's article on "Problems of a Water Works Land Owner" in the July *Water Works & Sewerage*, Mr. Bogert wrote, "What worries me is a new aspect of Watershed Protection. I [Mr. Bogert] never knew until I read LaDue's article (p. 215, top of center column) of the menace of newlyweds for whom the water works management must provide *bridal* paths."

Stops Under-Water Rusting *INSTANTLY!*

The Electro Rust-Proofing System of Cathodic Protection instantly and permanently stops rust formation on the under-water interiors of steel tanks and other water storage or water handling equipment. It kills the cause of rust — without paint, chemicals or moving parts. It's a simple electrolytic process. We engineer it to meet your corrosion problem—exactly. We install and guarantee it. Unnecessary to drain tank. Initial cost is usually about the same as one good cleaning and painting job; operation cost is negligible. Electro Rust-Proofing is serving leading municipalities and industries now, in standpipes, flocculators, deep wells and other types of water handling equipment. Advocated by recognized independent authorities. Write for new fact-filled folder.



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UNIVERSAL CAST IRON PIPE

Laid with Only Wrenches →

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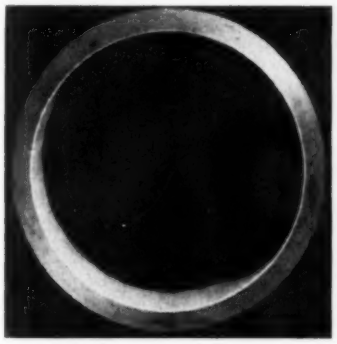
Cement-lined

MONO-CAST PIPE Prevents Tuberculation



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Economical and long-lasting Mono-Cast Pipe may be had with a variety of joints to meet every condition. Write for full details.

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GREASE *before it becomes a HAZARD!*

In the homes, restaurants, and factories of your community, grease is being continuously poured into the drains. Eventually it clogs the drain lines and sewers and interferes with proper sewage development. Josam Cascade Grease *Interceptors* remove the troublesome grease regardless of waste water temperature . . . end the problem of grease in sewage. Get complete information by writing for Josam Manual "A", the authority on grease interception.

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JOSAM MANUFACTURING CO.
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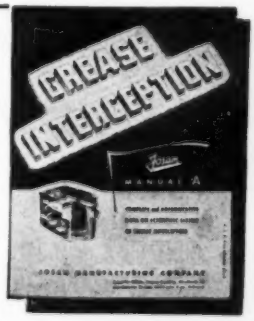
Address .....

City..... State.....



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BECAUSE IT WAS DESIGNED FOR HEAVY DUTY
Originally designed for heavy chemical services, this unusually rugged pump finds water service easy going. Its extra-heavy construction reduces vibration to a minimum, insures long life, and provides against frequent shut-downs for repair. For quick details, ask for Bulletin C-209. If you have a pumping problem, phone the nearest Porter office for a Quimby Engineer. He will give you data and information based on 50 years experience in the pumping field.
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Factories: Newark, N. J. • New Brunswick, N. J. • Pittsburgh, Pa.
McKeesport, Pa. • Blairsville, Pa. • Mt. Vernon, Ill.

Leave it to "Ed" R. Stapeley, Acting Dean of Engineering at Oklahoma A & M, to come up with a nifty idea for "The prevention of Intra-aural Ossification." Writing in the June issue of the Southwest Water Works Journal, Dean Stapeley says that the best way to keep from solidifying between the ears is "to join the AWWA, read the AWWA Jour., and the SWWW Jour., attend section meetings, national meetings, and short schools." I suppose you'll agree, Dean, that for sewage works operators the Fed. S.W.A. and the *Sew. Wks. Jour.* serve the same purpose.—And what do you think of W.W.&S., as a de-ossifier, Dean?

* * * *

When a recent issue of *Civil Engineering* contained a letter to the Editor about the adoption of the metric system, it was a sure bet that I'd receive a copy in the mail. Sure enough, in an envelope from the Board of Water Supply of Elizabeth, N. J. (could that be Sam Newkirk?) came the clipping—with no comment.

Evidently, my correspondent agreed with Mr. Edward Godfrey (the-letter-writer-to-the-editor) of Pittsburgh, who said, "Arguments for its adoption ignore absolutely the inconvenience and confusion it would mean to every man, woman and child who can read and talk. Arguments for the metric system are puerile..." (Is that word in the glossary, Mr. Bogert?)

Mr. Godfrey presents a good argument for our present system involving the "human tendency to divide by two." Mr. G. also asks what substitute there would be for the thousandth of an inch (how about the mu, millimu or ängstrom unit?) and complains that the weight of one gram is almost microscopic ("one could scarcely see it in a bottle"), while "the next unit (1000 g.) is far too many for measuring medicine, butter, etc., etc."

Hmmm! Medicine is now often measured in grains or minims—a grain, that's approx. 1/15 of a gram (even more microscopic), while a minim is approx. a drop. And, how big is an ounce?

And that jump from 1 g. to 1 kg. (a thousandfold) is only half as bad as the jump from a pound to a ton (2,000, or is it 2200 times?). Of course, between a pound and a ton you can use the bushel—but how much is a bushel—and whatever happened to the cwt.?

Maybe the metric system isn't the answer (although there are a few million persons in other countries who seem to live o.k. under the "inhuman" system), but tons that have two values, troy and avoirdupois ounces, bushels that weigh differently, all depending on what you're weighing, Fahrenheit degrees, and 12-month calendars seem just a little ridiculous. Aren't they?

* * * *

It was sad news from Carl Bernhardt, N. Y. Dept. of Health, Dist. Engr. at Jamestown, who wrote that Arthur H. Woefle, Supt. of Sewage Treatment at Dunkirk, N. Y., died as a result of complications following an operation last June. Art Woefle had been superintendent of the sewage plant since 1930 and was well known throughout western N. Y. where he was an active participant in the affairs of the Western Sect. of NYSSWA, having served on the Exec. Comm. His was the sewage treatment plant where acid wastes from steel pickling processes had eaten away the bar screens and generally played "hob" with operation at times. It was Art Woefle's cooperation and patience with the industry

that brought the final solution to a severe waste problem.

* * * *

Ken, "Official Bulletin" Lauster, sends word that A. W. "Andy" Anderson, Supt. of the Hettinger, N. Dak. Water Works has been having trouble with slimes in his lines (or at least in his reservoirs) and deep well pump rotors, and has borrowed an emergency chlorinator to dose the reservoir continuously and the well intermittently. If it works out, Andy, you should be a cinch for a visit from A. E. Griffin—somehow or another "Griff" always seems interested in things like that.

(Since this was written, Ken has resigned to join the USPHS.—Meet the new "O. B." Ed.: Jerry Svore.)

* * * *

Was sorry not to be in town when Maurice Le Bosquet of the Cincinnati office of the USPHS dropped in a few weeks ago. Would like to have seen him in his newly acquired uniform as a Major in the Regular Commissioned Corps of the U. S. Pub. Health Service. "Ski," besides being a top-flight golfer, you know, is the man responsible primarily for the Industrial Waste Guides of the Ohio River Pollution Survey.

* * * *

Saw a note to L. H. E. from W. F. Schaphorst, the "voice of experience" whose kinks, gadgets, and ideas have frequently appeared on the main pages of this magazine. "W. F." wrote from Brookings, S. D., where he was spending a vacation with his parents, his mother 85, and his father, who, at 92, drives a car. Now if W. F.'s grandparents were as long lived, then we can look forward to a great many more of his very practical contributions which have been so favorably commented upon by our readers.

* * * *

Wonder if Bob "Believe It Or Not" Ripley has been listening to some of Prof. Geo. Russell's lectures on Hydraulics at the NEWWA's water works schools in Boston? Ripley's syndicated cartoon recently contained the startling information that a circular conduit carries just as much water when 82 per cent full as it does when it is completely full. —Believe that one?

DO YOU HAVE THIS HANDY FILE?

When you are planning new water treatment plants, this file of useful data on chemical water coagulation with the N-Sol Processes answers such questions as —

"How to produce clearer, more sparkling water?"
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"How to reduce chemical costs?"
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* Patent Applied For.

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ENGINEERING CONTRACTORS
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Gentlemen:

We recently purchased eighteen bags of BOND-O, which we used as joining material to finish a project for the Department of Water and Sewers, City of Miami, consisting of approximately two miles of 30" Cast Iron Water Main.

With the exception of the eighteen bags of BOND-O referred to, the balance of the project was constructed with . . . . . .

BOND-O is decidedly a superior product to . . . . . which was proven to our satisfaction and to the Department of Water and Sewers on this project. The eighteen bags of BOND-O were used on the end of the line and, immediately after the line was completed, a test of 125 pounds pressure was put on the main and not one leak appeared in the BOND-O joints, whereas, there were many small ones in the . . . . . joints. This is remarkable, in that the section where the BOND-O was used had not previously had any water in it to soak up the jute, whereas, the part of the line on which the . . . . . was used had water in it immediately after it was laid.

We can sincerely recommend your product.

Yours very truly,

LEACH CONSTRUCTION COMPANY

W. E. Leach

WEL/vb

A Dependable Joint Compound for Cast Iron Water Mains

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This letter is one of many received from BOND-O users.

BOND-O users are extremely enthusiastic in their praise. Our "know-how" in the selection of minerals and scientific machine blending produces a compound which makes joints that are practically bone-dry from the start.

Our organization has many years of joint compound experience and a constant desire to produce the very best.

NORTHROP & COMPANY, INC.

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In the 27th report of L. C. Bishop, State Engineer of Wyoming, appears the following, "One water commissioner (Irrigation Ditches) resigned to enter the Merchant Marine Service and was succeeded by his wife, an engineer in her own right . . . Her work compares favorably with the work of any male water commissioner, except perhaps as to regulating and distributing water with the aid of gunny sacks and manure." Irrigation *and* fertilization???

Incidental Intelligence: In terms of per capita consumption in the U. S., paper is third, following *water* and milk. (From Monsanto's "Do You Know.")

* * * *

After all of the work that Commissioner of Public Works Newell L. Nussbaumer did to keep the streets of Buffalo free from snow last winter, one would expect him to know where the streets are. But for a fact, one day in April, he had to stop his car and ask a pedestrian the location of a street. I'll give you just one guess what the pedestrian said as he saw the words "Comm. of Public Works," on the car as it pulled away.

* * * *

The news gets around—after Dick (Gen. Chem.) Ockershausen saw that piece in W. W. & S. about a new use for filter alum (to keep rabbits from eating cabbages) he set to work to see if any one else knew it—found a revealing article on the same subject, in the "Eastern Cooperative," June, 1945. Dick predicts that "just as H_2SO_4 production is the barometer of all industrial activity, alum sales will in all likelihood now become the barometer of home gardening activity."

Future W. & S. Wks. Projects

Indicated by Federal Grants for Construction Planning

Since July 28 a number of additional Federal advancements of funds have been made to cover engineering and post-war construction plans. These advances, like those announced in our August issue, were made available through the Bureau of Community Facilities of the Federal Works Agency and are to be repaid without interest if and when construction begins. Communities receiving advances for proposed water and sewage works projects are listed as follows:

Community and Facility	Estimated Cost
Alabama:	
Anniston (sewage)	$ 536,594
Anniston (sewage)	212,422
Eufala (water)	79,270
Fort Payne (sewage)	130,000
Gainesville (sewage)	10,500
Mobile (sewage)	831,790
Arkansas:	
Mena (water)	7,250
Pine Bluff (sewage)	284,300
California:	
Oxnard (sewage)	94,120
Oxnard (sewage)	77,761
Colorado:	
Denver (water)	2,825,000
Connecticut:	
Bridgeport (sewage)	929,000
Clinton (sewage)	39,400
Wallingford (sewage)	200,000
Florida:	
Bradenton (water)	200,000
Ocala (sewage)	248,500
Georgia:	
Augusta (water)	86,000
Bowman (water)	52,260
Cobb County (water)	167,534
Cobb County (sewage)	81,824
Decatur (sewage)	130,000
Warm Springs (sewage)	43,594
Warm Springs (water)	25,468
Waycross (sewage)	526,877

Community and Facility	Estimated Cost
Illinois:	
Bensenville (water)	27,300
Bloomington-Normal (sewage)	340,000
Bushnell (sewage)	145,110
Carmi (water)	103,440
Carterville (sewage)	54,000
Collinsville (sewage)	188,486
Erie (sewage)	75,000
Flat Rock (water)	55,560
Hutsonville (sewage)	55,240
Macomb (sewage)	197,300
Mound City (sewage)	150,000
Mt. Vernon (sewage)	468,614
Murphysboro (sewage)	278,000
New Baden (sewage)	100,500
New Baden (water)	54,000
Normal (sewage)	385,000
Pontiac (sewage)	300,000
Shelbyville (sewage)	281,000
Shelbyville (sewage)	159,400
St. Francisville (sewage)	63,991
Streator (sewage)	518,000
Troy (sewage)	107,500
Indiana:	
Monticello (sewage)	92,700
Iowa:	
Grimes	71,530
Kentucky:	
Greenville (sewage)	179,688
Madisonville (water & sewage)	33,700
Scottsville (water & sewage)	124,101
Maine:	
Bangor (sewage)	560,000
Williamsburg (water)	35,215
Massachusetts:	
Chicopee (sewage)	465,416
East Longmeadow (water)	21,843
East Longmeadow (water)	50,945
East Longmeadow (sewage)	44,085
East Longmeadow (sewage)	109,788
Marlborough (sewage)	150,000
Michigan:	
Cadillac (sewage)	222,000
Dowagiac (water)	135,000
Pinconning (sewage)	48,000
Minnesota:	
Canton (water)	6,600
Canton (sewage)	69,100
Mississippi:	
Biloxi (sewage)	342,000
Columbia (sewage)	98,500
Pearl River (sewage)	92,446
Picayune (water)	219,969
Picayune (sewage)	238,165
Heidelberg (water)	69,750
Heidelberg (sewage)	101,250
Shelby (water)	99,800
Missouri:	
Bel-Nor (sewage)	78,000
Bowling Green (sewage)	82,000
Brentwood (sewage)	97,800
Buffalo (sewage)	113,000
Camdenton (sewage)	137,000
Hayti (sewage)	74,500
Hillsboro (sewage)	42,000
Hillsboro (water)	36,700
Houston (sewage)	97,500
Ironton (water)	53,000
Jennings (sewage)	213,000
Montgomery (sewage)	40,740
Montgomery (water)	25,400
Portageville (sewage)	83,500
Portageville (water)	20,500
Richland (sewage)	128,500
Richland (water)	23,000
St. Louis County (sewage)	114,000
St. Louis County (sewage)	95,000
Thayer (sewage)	132,000
Vinita Park (sewage)	114,560
Wentzville (sewage)	31,810
Windsor (sewage)	30,000
New Jersey:	
Cliffside (sewage)	332,700
New York:	
Greenport (water)	91,000
Kingston (sewage)	60,000
Kingston (sewage)	30,000
Kingston (sewage)	90,000
Watkins Glen (sewage)	37,500
Ohio:	
Akron (water)	877,000
Ottawa (sewage)	228,800
Ottawa (sewage)	96,200
Oklahoma:	
Henryetta (sewage & water)	157,902
Laverne (sewage)	3,092
Muskogee (sewage)	525,500
Wagoner (sewage)	76,975
Pennsylvania:	
Lewiston Borough (sewage)	629,700
South Carolina:	
Edgefield (water)	156,920
North Charleston (water)	189,000
Ridge Spring (water)	63,160
Tennessee:	
Oliver Springs (water)	140,299
Jasper (sewage)	58,841
Jasper (sewage)	70,365

Hazleton Type "M"

CHECK VALVE

with Built-in Mercoid Motor Shut-off Switch for Automatic Pump Protection

PROTECTS PUMP FROM DAMAGE DUE TO LOSS OF WATER

PREVENTS OPERATION OF PUMP UNTIL PROPERLY PRIMED

Glow switch insures pump against damage in event pump loses water during operation. Mercoid switch is actuated by valve flap. Switch is connected into no-voltage coil of motor starter.

Write for Further Information.

BARRETT, HAENTJENS & CO.
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Manhole Cushion U. S. Pat. No. 2,050,050 offers you the simplest solution for noisy, rattling covers. Easy to install. Lasting — Economical.
Write for story of Tapax and Trial Offer.

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ZECO GREENSAND ZEOLITE

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LIKE A VENTRILOQUIST'S DUMMY

. . . the rotating head of a MATHEWS MODERNIZED HYDRANT can swing in a full circle to let the nozzle face North, South, East, or West. Loosening a few bolts does the trick. All the working parts of a MATHEWS are enclosed in a replaceable barrel. Very convenient in case of breakage. Simply unscrew and remove the broken barrel, put a spare in its place. No digging necessary. Hardly any more time or labor than putting a film in a camera. MATHEWS MODERNIZED HYDRANTS are as dependable as they are simple. They provide the kind of protection that stands-up in an emergency.

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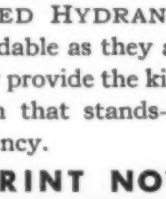
INSIST ON THE **WILSON** HYPO-CHLORINATOR



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THE *Phipps & Bird* LABORATORY MIXER . . .

IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.

PHIPPS & BIRD, INC. Richmond, Va.

Community and Facility	Estimated Cost
Texas:	
Alvin (water)	45,000
Carthage (water)	112,202
Carthage (sewage)	102,428
Cleburne (sewage)	.....
Muenster (sewage)	31,500
Vermont:	
Burlington (sewage)	700,000
Virginia:	
Henrico Co. (sewage)	466,000

MANUFACTURERS' and EQUIPMENT NEWS

Pretty? (We Think So!)

The other day we glimpsed this very attractive picture with an account of the launching of one of the U. S. Navy's landing craft—now famed LST ships, which made history in the South Pacific and Europe.

(Official U. S. Navy Photo)

We thought we recognized the lady ready to break the champagne bottle on the LST's prow, and, "sho-nuff," we did. Whereupon we wrote for a copy of the picture and asked said christener's hubby if there would be any objection to reproducing the picture to lighten up these columns. Having gotten the green light, allow us to introduce Mrs. Milo E. Smith,

wife of the publicity manager for Chicago Bridge & Iron Co., which has almost a trunkful of Army-Navy "E" pennants for its schedule beating production of U. S. Navy LST (Landing Ship Tank) vessels, along with other war material.

Gas-Diesel Thermal Efficiency Goes Up!

Announcement has recently been made by the Cooper-Bessemer Corp. of Mt. Vernon, Ohio, that one of their Type JS engines has attained a thermal efficiency of over 40 per cent. This engine is a turbo-charged dual fuel engine which operates on gas or fuel or combinations of both. According to company officials, this efficiency is higher than the "highest thermal efficiency record ever accomplished by steam, gas, gasoline, gas turbine or diesel engine." (Gasoline or gas engines usually attain thermal efficiencies of 25 per cent.)

Considering that this is the type of engine proposed for use on sewage gas (as well as elsewhere), it appears that power development in sewage plants is in for a big increase in the future.

New Silicone Valve Lubricant

A new valve lubricant of unusual properties, identified as Nordcoseal Lubricant No. DC234-S, a Dow Corning silicone product, is being distributed exclusively by Merco Nordstrom Valve Co.

The lubricant is colorless and its viscosity changes only slightly over a very wide temperature range. It is recommended for working temperatures ranging from —40° F. to +400° F. Due to its extremely low vapor pressure, it does not evaporate appreciably even at elevated temperatures.

Principal services of this new lubricant are steam, hot water, hot air, oxygen, high vacuum, also for dilute solutions of mineral acids (except nitric and hydrofluoric acid below 250° F.); natural and synthetic rubbers, acetic acid, acetic anhydride, and ethyl alcohol below 250° F. Nordcoseal Lubricant No. DC234-S is available only in soft bulk form for application by grease guns.

Further details may be obtained from Merco Nordstrom Valve Co., 400 Lexington Ave., Pittsburgh 8, Pa.

Let's look at the record . . .

Look beneath the surface

Seven years of trouble-free, continuous operation . . . seven years of accurate, efficient, hydraulic separation . . . so reads the record of the Rex Conveyor Sludge Collectors installed in the primary tanks of the modern Racine, Wisconsin, Sewage Plant.

Unusual? Not at all! Racine is typical of hundreds of other similar Rex installations . . . designed and built with Rex equipment that operates *dependably* and *economically* below the liquid surface of any rectangular tank.

- **Maintenance and repairs are negligible.**
- **Tanks are positively skimmed, always look neat.**
- **Cleaning of corners by pivoted flights prevents any formation of septic sludge.**
- **Sludge concentrations of better than 8% solids are possible with cross collector in each tank.**
- **Because Rex equipment is properly designed and constructed it will remain "as good as new" in appearance and performance for many years.**

These are but a few of the many features that Rex equipment offers. That's why it will pay you to have Rex engineers work with you . . . adapt Rex equipment to your specific conditions. There is no obligation. Simply write Chain Belt Company, 1610 West Bruce Street, Milwaukee 4, Wisconsin.

Blueprint Now!

REX **SANITATION EQUIPMENT**

Triturators • Bar Screens • Tow-Bro Sludge Removers • Slo-Mixers
Aero-Filters • Rapid Mixers • Grit and Sludge Collectors and Grit Washers

CHAIN BELT COMPANY OF MILWAUKEE

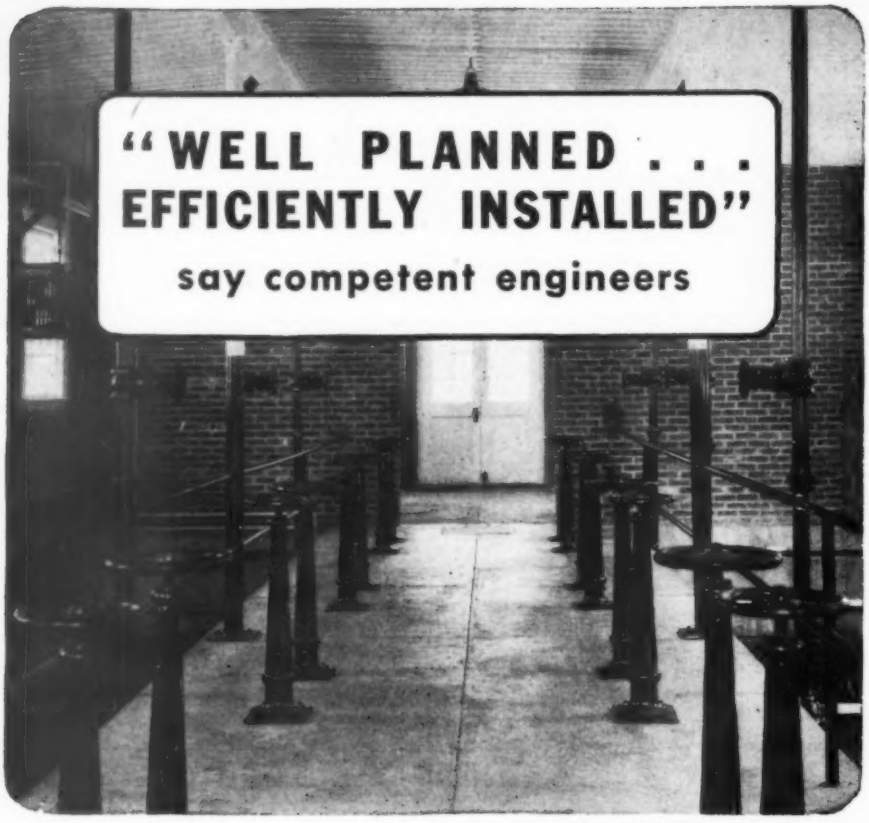
Member of the Water and Sewage Works Manufacturers Association, Inc.

Peerless Pump Territories Rearranged

Peerless Pump Division of Food Machinery Corp. has rearranged territorial distribution by the establishment of five sales districts.

Mr. Warner G. Vaughan has been appointed Atlantic Dist. Sales Mgr. with offices in Suburban Square, Ardmore, Pa. The Southeastern territory is under the management of Charles E. Tierney with offices in the Blair Building, 215 Church St., Decatur, Ga. Edward W. Pierce will continue in charge of the Central territory as Dist. Sales Mgr. with headquarters at the Peerless Canton, Ohio, works. The Southwestern territory has for its Dist. Sales Mgr. William E. Griffin, and headquarters are at 122 E. 5th St., Plainview, Tex. Mr. B. A. Tucker is Pacific Dist. Sales Mgr., with headquarters at 301 West Ave. 26, Los Angeles, Calif.

Uhrich Supply Co. of North Kansas City has been appointed distributor of Peerless vertical and horizontal pumps in the Kansas-Missouri area. C. H. Pratt is manager of the Uhrich organization, which succeeds Butters Equipment & Supply Co., recently retired from business.



Norwood Filters and Operating Floor at American Brass Co., Ansonia, Conn.

Wherever you find a Norwood Filter installation you find a model of operating efficiency. Not only are the basic designs according to the most modern engineering practice, but also the operating floor is built for efficient control.

In a Norwood installation, pollution and foreign matter removal may be combined with aeration and automatic chemical treatment to correct objectionable odors, color or organic and mineral content.

Norwood engineers are familiar with every phase of industrial and municipal filter requirements, and are always glad to work with consulting, city or plant engineers in determining exactly how best to solve any water treatment problem. Your inquiries are cordially invited.

W-2

The NORWOOD ENGINEERING COMPANY
25 N. Maple St.
Florence, Mass.

The Best For Your Money
NORWOOD FILTERS
In The Long Run

Army-Navy Awards

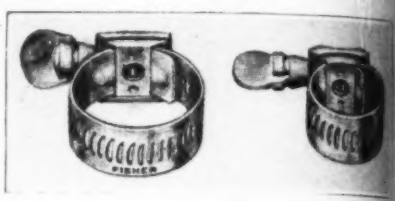
Probably among the last manufacturers to receive the Army-Navy "E" for production excellence in World War II are the following companies: Aurora Pump Co., Aurora, Ill. (first star), Central Foundry Co. of New York, Chain Belt Co. of Milwaukee (its fourth star), American Radiator and Standard Sanitary Co. (Pittsburgh Works), Voght Bros. Mfg. Co., Louisville, Ky., and the DeLaval Steam Turbine Co. of Trenton, N. J.

In the past few years we have announced in these columns the names of a great many manufacturers of water works and sewage works equipment who turned from peaceful pursuits to the production of war equipment and were rewarded for their efforts with the signal honor of the Army-Navy "E" and its star for each six months of high excellence in production.

We salute all of those companies so honored and look forward to seeing them convert to production that will see a growth of water and sewage works and the repair of many now so badly in need of maintenance.

Improved Clamps for Hose Connections

It's only a small thing, but sometimes it's mighty important that that piece of rubber tubing fits tightly on its apparatus. Fisher Scientific Co. has a new Adjustable Rubber Tubing Clamp of improved design which not only enables better connections to be made in joining rubber to pipe, serrated hose cocks, or laboratory apparatus, but also makes it possible for two of these clamps to serve the range of six previously required.



The clamp operates by the simple turning of a thumb screw which operates a worm gear in a housing which in turn is attached to one end of a metal strip. This ½ in. strip is looped to form a circle and the loose end inserted in the housing. The worm gear engages slots in the band and moves it so that its circumference is decreased or increased.

Two sizes of clamps are suitable for making all of the connections ordinarily used in a laboratory. They fit over heavy pressure-vacuum tubing and can be pulled tight on pipes and hose connections commonly used for water, compressed air, or gas. Size A is for tubing of 7/16 to 25/32 inch O.D. and Size B is for tubing of 9/16 to 1 1/16 inch O.D. Priced at 30 cents each or $3.25 per dozen.

These hose clamps may be obtained from Fisher Scientific Co. in Pittsburgh, Pa., or New York, N. Y.

Propeller-type Meter Now Available for Hot Water

Widely used for metering water at ordinary temperatures, Builders "Propeloflo" Meter is now available at no extra cost for metering hot water up to 250° F. A special high temperature grease is employed for efficient lubrication. Venturi design and all other special features of this streamline propeller-type meter are retained. The "Propeloflo" is extremely useful where a simple totalizing meter is desired. Further information may be had by writing Builders-Providence, Inc. (Division of Builders Iron Foundry), Providence 1, R. I.

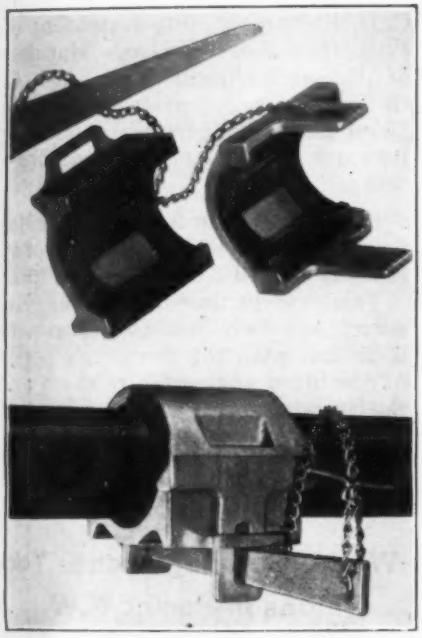
C. L. Williams Added to Foxboro's N. Y. Staff

The Foxboro Co., Foxboro, Mass., maker of industrial instruments for measurement and control, has announced that Clarence Leslie Williams has joined its staff of sales engineers whose headquarters are in the company's New York office, 420 Lexington Ave. He has been assigned to the northern New Jersey territory and has already entered upon his new duties.

Mr. Williams is a native of New Jersey and a graduate of Stevens Institute of Technology, at Hoboken.

Presto-Lock Pipe Couplings

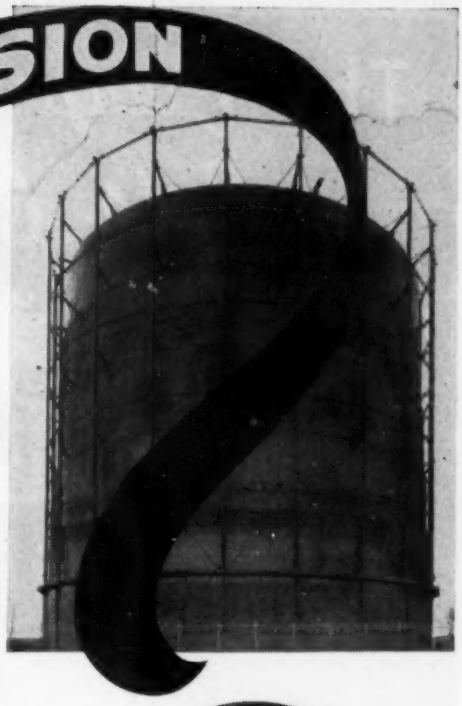
A new line of flexible pipe couplings, made in 11 sizes from 1¼ to 16 in. and known as the Drinkwater Presto-Lock Couplings, is being manufactured by Drinkwater, Inc., of 2323 So. Michigan Ave., Chicago, Illinois.



These three-piece corrosion-resistant malleable iron castings and quick-locking wedge key can be used with any plain end pipe without threads, grooves, or flanges. Only a hammer is needed to tighten or loosen the key in its channels.

Three types of gaskets, synthetic rubber, neoprene, and natural rubber, give the couplings up to 40 degree flexibility at each joint. A four page bulletin giving engineering data and complete specifications is available from Drinkwater, Inc.

Is CORROSION Getting the better of your GAS HOLDERS



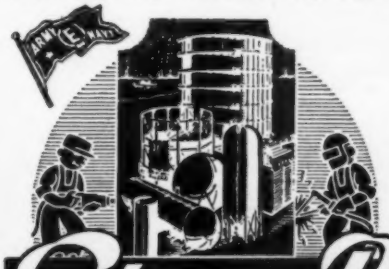
Are you sure of the condition on the INTERIOR of your gas holders—where corrosion usually does the most damage?

When you avail yourself of the Stacey Brothers Inspection Service, you not only definitely know the inside condition of your holders, but you are also given definite recommendations for combating further progress of corrosion that has already developed. Our recommendations also cover an estimate of the cost to repair damaged parts of your holders. Stacey Brothers Inspection Service can be relied on because it is based upon many years of experience in the design, manufacture, erection, and maintenance of the majority of gas holders located in the United States.

Stacey Brothers Inspection Service is the best "insurance" you can have against the dangers and expense of corrosion, shutdowns, and "accidents." Write for Bulletin I-44.

The STACEY BROS. GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 Vine St., Cincinnati 16, Ohio

Shown above is photo of an actual coupon taken from gas holder. Note the presence of deep corrision. Stacey Brothers Inspectors thoroughly coupon each holder at all points that are vulnerable to corrision.



GAS HOLDER INSPECTION SERVICE

Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

Wilson Pulsafeeder Sold to Lapp Insulator Co.

Exclusive rights to the Pulsafeeder chemical proportioning pump, introduced six years ago and since marketed by Wilson Chemical Feeders, Inc., of Buffalo, N. Y., have been purchased by the Lapp Insulator Co., Inc., Le Roy, N. Y.

The Lapp organization through its Process Equipment Division now markets chemical porcelain valves, pipe, raschig rings, and a wide line of corrosion-free process equipment.

Lawrence E. Wilson, who invented and developed the Pulsafeeder, and Victor H. Liepold, Service Engr., as well as other Wilson personnel, have become affiliated with Lapp and will continue in responsibility for Pulsafeeder engineering, manufacture and service. Wilson Chemical Feeders, Inc., of Buffalo is not otherwise affected by the Pulsafeeder transaction and will continue the manufacture and sale of filling machines and other products.

The *Coagulant* that *Cuts Costs!*

TENNESSEE CORPORATION Ferri-Floc

Ferri-floc . . . the ferric coagulant that is successfully and economically used in sewage treatment throughout the United States. Take advantage of modern plant research and findings: use Ferri-floc. Tennessee Corporation's technical staff will be glad to help you with your specific problems. Write to us today. The consultation service is free, of course.

The Mark of Quality

TC TENNESSEE CORPORATION

Tennessee Corporation

ATLANTA, GEORGIA LOCKLAND, OHIO

Mathieson Changes and Appointments

Maurice C. Taylor, formerly Manager of Research at the Niagara Falls Laboratories of The Mathieson Alkali Works, has been appointed Resident Director of Research and Development, according to a recent announcement by George W. Dolan,

D. MacMahon M. C. Taylor

President. Other Research Department changes are announced as follows: J. Douglas MacMahon, heretofore Asst. Mgr. of the Sales Development Dept., has been named Assistant to the Technical Director; C. N. Richardson, Superintendent of Pilot Operations, becomes Manager of Research Engineering; and C. Gerald Day, a Superintendent in the Development Department, becomes Research and Plant Liaison Engineer.

Both Mr. Taylor and Mr. MacMahon will report to Dr. G. P. Vincent, recently named Technical Director.

This reorganization of the Research and Development Department is in line with the company's policy of continued aggressive research and the coordination of sales development and plant operations with research.

Wade Co. Represents Yeomans in Pacific N.W.

Now representing Yeomans Bros. Co. in Oregon and southwest Washington is R. M. Wade and Co. of Portland, an organization with an 80 year history which parallels the growth of the Pacific northwest. President of the firm is Wade Newbegin who is a grandson of Robert M. Wade, founder and first president from 1865 to 1915.

Originally distributors of wagons, buggies and horse-drawn farm implements, the Wade company now has broadened its activity to include manufacturing, as well as sales and distribution of a wide variety of agricultural implements,

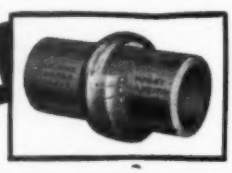
EDSON

DIAPHRAGM PUMPS

Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
Red Seal Diaphragms
Strainers and Foot Valves
Hose Spanners—Adapters

THE EDSON CORPORATION
Main Office and Works: 49 D St. South Boston, Mass.
New York: 142 Ashland Pl., Brooklyn

WESTON



GASKET AND FORM
The Perfected Method for Making Sewer Pipe Joints of Cement

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON Adams, Mass.

pumping equipment, irrigation and water supply systems and other machinery. As Yeomans representatives, the Wade Co. will handle the complete Yeomans lines of sewage, drainage and horizontal pumps, condensate return units, rotary air compressors, vacuum pumps and gas boosters and sewage treatment equipment. H. D. Smith is manager of the pump department.

As part of its facilities, the Wade company operates its own block-long manufacturing plant.

A.C.F. News

The Board of Directors of American Car and Foundry Export Co. recently elected R. A. Williams Exec. Vice President and made him a Director of A.C.F. Mr. Williams is also Vice President in charge of sales of American Car and Foundry Co. and will be in direct supervision of sales, subsidiary companies, and foreign representatives of American Car and Foundry Export Co.

Westinghouse Acquires B. F. Sturtevant Co.

Acquisition of the B. F. Sturtevant Co., of Boston, Mass., the pioneer in the design and manufacture of air handling and processing equipment, has been announced by the Westinghouse Electric Corporation.

The Sturtevant Co. becomes a wholly-owned Westinghouse subsidiary, operating as the B. F. Sturtevant Co., a Division of Westinghouse Electric. Management of the Stur-

This new publication describing meters for sewage, industrial wastes, sludge and irrigation water should be part of your file on flow measurement. Ask for Bulletin 62.

FEATURES of
BAILEY OPEN CHANNEL METERS

1. Low Cost
2. Easy to Install
3. Easy to Maintain
4. Retain Accuracy
5. Self-Cleaning
6. Adjustable Capacities
7. Indicate, Record and Integrate
8. Totalize Multiple Flows
9. Rate of Flow and Ratio Controls
10. Simple Chemical Feed Controls

MU21
BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND 10, OHIO
Meters and Controls for Sewage and Water
VENTURI TUBES, FLUMES, WEIRS, NOZZLES, ORIFICES • DIRECT MECHANICAL AND REMOTELY LOCATED REGISTERS • AIR-OPERATED, ELECTRONIC AND ELECTRIC CONTROLS.

SAVE MONEY USE ACTIVATED ALUM and BLACKALUM

STUART-BRUMLEY CORP.
516 North Charles St.
Baltimore Maryland

ANTHRAFILT
A Filter Medium For All Purposes
ANTHRACITE EQUIPMENT CORP
101 Park Ave. New York
C. E. PALMER
Engineer and Sales Representative
822 E. 8th STREET ERIE, PA.

STOP
JOINT LEAKAGE
WITH
CARSON CLAMPS
AND MECHANICAL JOINTS
Charcoal iron bolts for Cast Iron Pipe and Fittings.
Write for Prices.
Carson-Cadillac Co.
1221 PINSON ST. BIRMINGHAM, ALA.

DOW
FERRIC CHLORIDE
35-47% SOLUTION
Shipped in Tank Cars
60% CRYSTALS
Packed in 300 or 500 lb. Barrels

★ SLUDGE CONDITIONING
★ SEWAGE COAGULATION
★ WATER PURIFICATION

THE DOW CHEMICAL COMPANY
MIDLAND MICHIGAN

MORE WATER
—LESS WORRY
by CLEANING your WATER MAINS
using The NATIONAL METHOD

No need to worry about reduced water main capacities just when you need every gallon you can pump. Do as many other communities — large and small — are doing: clean those old clogged up mains by using the NATIONAL METHOD of water main cleaning.

We offer you (1) greater volume of water; (2) lower pumping costs; (3) improved pressure; (4) cleaner water and (5) reduced insurance rates.

Before Cleaning

★ The NATIONAL METHOD

After Cleaning

GUARANTEED TO RESTORE
95% ORIGINAL CAPACITY

The National Water Main Cleaning Co.
30 Church St. Branches: New York 7

1221 Mortgage Guarantee Bldg., Atlanta 3, Ga.
607 First Nat'l Bank Bldg., Birmingham, 3 Ala.
115 Peterboro St., Boston 15, Mass.
205 West Wacker Dr., Chicago 6, Ill.
P. O. Box 683, Jacksonville 1, Fla.
3707 Madison St., Kansas City 2, Mo.
2028 Union Ave., Montreal 2, Can.
3812 Castellar St., Omaha 5, Neb.
210 E. Franklin St., Richmond 19, Va.
7103 Dale Ave., St. Louis 17, Mo.
501 Howard St., San Francisco, Calif.
P. O. Box 887, Waco, Texas
576 Wall St., Winnipeg, Can.

tevant Company was assumed by Westinghouse about Sept. 1.

The Sturtevant Co., according to the announcement, "is the largest and best known company in the air handling business in the United States," with factories at Boston, Camden, N. J., LaSalle, Ill., Berkeley, Calif., and Galt, Ont.

A Portable Utility Roller Conveyor

The handy Herculean Portable Roller Conveyor is a unit widely used for conveying pipe, tubes, rods, bars, lumber, poles, etc. It is designed for use either as a single unit, or in groups of two or more units placed in line for transferring material longer distances. It has found wide and varied usage in warehouses, storage yards, and for loading or unloading box cars and trucks. It can be used for transfer of pipe from truck to trench side. In fact, the units can ride with the truck and therefore serve for loading and unloading at the two ends with a minimum of equipment needed for the dual job.

This general utility conveyor carries a lifetime guarantee, saves time and money in handling materials, and prevents accidents.

The Herculean Roller Conveyor has an adjustable swivel center post which raises the roller to a 51 inch height above ground or floor level. The minimum setting is 38 inches above ground level, but, of course, this can be made lower by placing the feet in holes. The floor space covered is a rectangle 28½ by 50 inches. Having a safe weight capacity of 1,000 pounds, it can handle pipe as large as 12 inches in diameter. Even so, the complete unit weighs but 81 pounds. Moderately priced, Herculean Roller Conveyors can be ordered on a trial basis if desired.

For an illustrated folder giving additional details covering this moderately priced unit of many uses, write the John Moore Specialty Co., 6130 N. Hiawatha Ave., Chicago 30, Ill.

Berle Returns to Innis-Speiden

Effective the first of July, Col. Charles H. Berle was appointed coordinator of Sales and Manufacturing for Innis, Speiden & Co.

Associated with Innis, Speiden & Co. since 1926, Colonel Berle was called to active duty by the Army in 1941, and returned to inactive reserve status in June, 1945.

Colonel Berle will be responsible for the coordination of research, manufacturing and sales development for Innis, Speiden & Co. and will be located in the Company's general office at 117 Liberty Street, New York 6, N. Y.

Pemco News

Pittsburgh - Equitable Meter Co. has announced the appointment of E. E. Matheson as Sales Manager of the Merco Nordstrom Valve Co., a division of the parent firm. Since 1928, Mr. Matheson has been associated with Merco-Nordstrom, first as a sales engineer and then as a branch manager. In 1940 he was appointed Asst. to the General Mgr. of the Oakland Calif. plant of the company.

W. F. Rockwell, Jr., vice president of Pittsburgh Equitable Meter Co. has been promoted to the rank of Captain in the Army. Entering the service as a private in Feb., 1943, young Rockwell has progressed through non-commissioned ranks, officers candidate school and the ranks of 2nd and 1st Lieut.

Contaminated water can be cleaned *right through* with the cleansing and purifying powers of SOLVAY Liquid Chlorine.

This orange liquid is safeguarding the health of our soldiers by "washing out" impurities, foul taste and odors from water supply units. And over here, municipal water works systems also rely on this effective liquid to purify drinking water and safely dispose of sewage wastes.

Always . . . treat germ-ladened, dirtied water with SOLVAY Liquid Chlorine—*It cleans right through!*

SOLVAY LIQUID CHLORINE

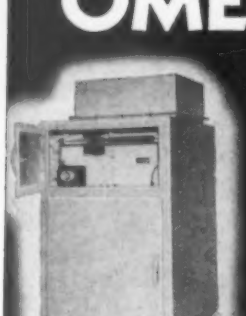
SOLVAY SALES CORPORATION
Alkalies and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street New York 6, N. Y.
BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati
Cleveland • Detroit • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

Carborundum Appoints Two District Managers

Vice President and General Sales Manager F. J. Tone, Jr., of The Carborundum Company, Niagara Falls, N. Y., has announced the appointment of William H. Homeyer and Francis J. Blake as District Sales Managers. Both appointments became effective as of July 1.

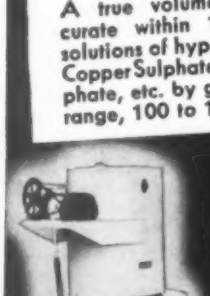
Mr. Homeyer, with headquarters at Los Angeles, is to have charge of the Southern California area and Mr. Blake, with headquarters in San Francisco, will have charge of the Northern California area. Both have been long and well known in Pacific Coast industrial districts, having previously represented the Carborundum Company as industrial salesmen.

NEED A
CHEMICAL FEEDER?
Specify an
OMEGA



GRAVIMETRIC FEEDER
"Loss-in-weight" Type
The most accurate type chemical feeder . . . weighs, feeds and records dry materials within 1% of rate set on feed dial.

PRECISION FEEDER
For Liquids
A true volumetric feeder, accurate within 1% for feeding solutions of hypochlorite, Calgon, Copper Sulphate, Ammonium Sulphate, etc. by gravity . . . feeding range, 100 to 1.



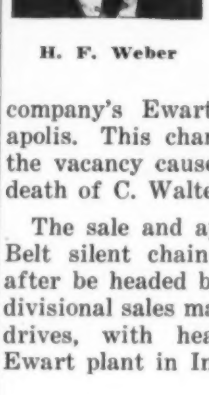
UNIVERSAL FEEDER
A rugged, dependable Volumetric dry feeder, simple in design, handles lumps or powder without clogging. Easy feeding rate adjustment.

The Omega line of chemical feeders is complete. Write for Bulletins

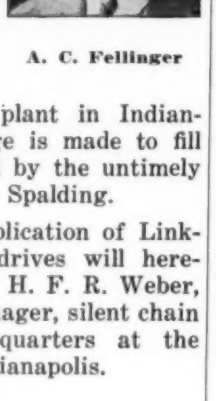
Sincerely
OMEGA MACHINE CO.
(Division of Builders Iron Foundry)
10 CODDING ST., PROVIDENCE 1, R. I.

Link-Belt Promotions

Link-Belt Company, Chicago, has announced the appointment of A. C. Fellinger to the position of sales manager, power transmission machinery, with headquarters at the



H. F. Weber



A. C. Fellinger

company's Ewart plant in Indianapolis. This change is made to fill the vacancy caused by the untimely death of C. Walter Spalding.

The sale and application of Link-Belt silent chain drives will hereafter be headed by H. F. R. Weber, divisional sales manager, silent chain drives, with headquarters at the Ewart plant in Indianapolis.

Calgon on the Alcan

Among the water treatment products that are serving our military efforts is Calgon, the hexa-metaphosphate for preventing red water and corrosion. When red water attacked the water supplies along the Alcan Highway, Calgon treatment was instituted.

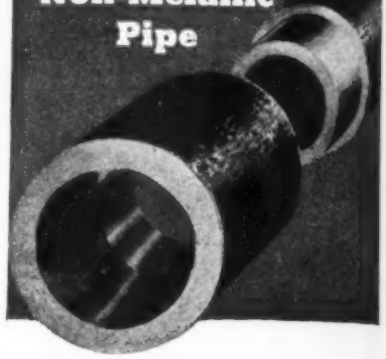
Determination of the chemical dosage was made on samples of water flown from Alaska to the Pittsburgh Laboratories of the Calgon Co. Two ppm. has been sufficient to control the corrosion and red water caused by a high CO_2 content and dissolved oxygen.

Alconox Cleaner

Alconox, a new wetting agent or detergent, has been announced by Standard Scientific Supply Corp., 34 West 4th Street, New York 12, N. Y. This new cleanser works equally well in hard water and acid solutions, and is particularly effective in removing grease. It leaves no surface film or streaks and should find use in either the sludge pump station or the laboratory of a sewage plant as well as elsewhere in both water and sewage plants.

LASTS
A LIFETIME
underground

The Modern
Non-Metallic
Pipe



ORANGEBURG PIPE with TAPERWELD joints is now widely used in many progressive communities the country over. It is the permanent, non-corrodible, root-proof pipe that won't tuberculate, is easy to handle and install, does not chip or break easily, and is preferred for long, trouble-free service in

- House-to-Sewer Connections
- Downspouts
- Industrial Drainage
- Septic Tank Filter Beds (Perforated)
- Foundation Drains (Perforated)

ORANGEBURG PIPE has very low friction losses—increases flow capacity. Williams & Hazen Formula, C = 150.

Write for bulletins showing mechanical strength, hydraulic and chemical properties. THE FIBRE CONDUIT COMPANY, DEPT. WWS-9-45, ORANGEBURG, N. Y.

ORANGEBURG
The Root-Proof Pipe

Worthington Appointments

Recent news releases from the Worthington Pump and Machinery Corp. of Harrison, N. J., tell the stories of the appointment of S. Riley Williams as Director of International Business, and of the naming of Herman J. Schorle as Works Manager of the Holyoke Works.

Mr. Schorle succeeds Harry A. Feldbush, who has assumed administrative duties in the general offices of the corporation. Assisting Mr. Schorle in his new appointment is Willard A. Emery, former superintendent of all welding operations at the Holyoke Works.

LITERATURE AND CATALOGS

Would you think of looking in a marine equipment catalog for equipment to be used in water and sewage works? Well, you should, and the catalog in particular to look into is Varec's **Approved Marine Equipment, Catalog M-6,** which contains quite a number of items of interest. For instance, there are Angle Relief Valves, designed especially for use in water, oil, air, steam or gas service, most of which you'll find in both water and sewage plants.

Then there are the Varec pressure and vacuum relief valves, atmospheric type, which ought to find use on sludge digestion gas holders or tanks. And for those same digestion tank covers, "Varec's" Gauge and Thief Hole Covers (no-sparking and gas tight) should be ideal for those sampling hole covers; and the roof manhole covers might find use on the same digestion tank.

For those gas lines around a digestion tank, or any place in the sewage plant, the entrainment type separator and flame arrestor has its application as a matter of safety.

Other "Varec" Sewage Gas Control and Safety Equipment is comprehensively treated in **Catalog S-3,** which may be obtained from the Vapor Recovery Systems Co., 2820 N. Alameda St., Compton, Calif.

* * *

Some persons like one kind of valve, some like another, still others say that different types of valves have different effective uses. Which-

NEW! *72 page bulletin on...*

"GUNITE"

...and how to use it

PROFITABLY

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
MANUFACTURERS OF THE "CEMENT GUN"
GENERAL OFFICES AND WORKS—ALLENTOWN, PENNA., U.S.A.
NEW YORK DISTRICT OFFICE—EMPIRE STATE BUILDING
CHICAGO DISTRICT OFFICE—ONE LASALLE STREET BUILDING
GUNITE AND CEMENT GUN CONTRACTS, LTD.—TORONTO, ONT.
CEMENT GUN COMPANY, LTD.—BRENTFORD, LONDON, ENGLAND

This new Bulletin C2300 is packed with useful information, photographs and drawings. It contains sections devoted to design data and specifications . . . repairs and relining of reservoirs and construction of new reservoirs . . . repairs to bridges, buildings, dams, walls, sewers . . . "GUNITE" linings of pipe, canals, coal bunkers . . . construction of prestressed "GUNITE" water tanks . . . encasement of structural steel and literally scores of uses you may be overlooking.

Write for your free copy of Bulletin C2300 today.

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

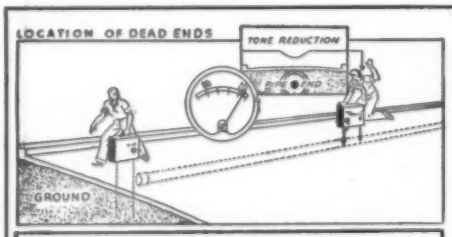
Warren Pipe Company of Mass., Inc.

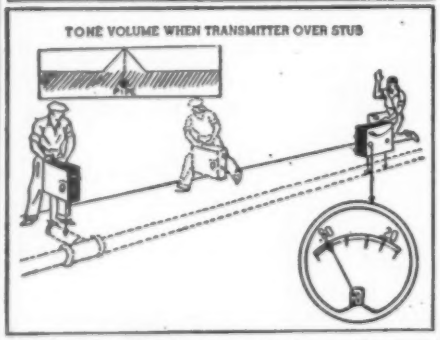
OPERATING VALVES WITH DEAN OPERATING MACHINE

"Power take-off from truck motor makes short order of this otherwise laborious and time consuming job."

The above statement was made by Alan D. Drake, Director, Division of Water, Buffalo, N. Y., in an article in the April 1945 issue of Water Works and Sewerage.

RENSSELAER VALVE CO. **TROY, N. Y.**





M-SCOPE

Buried Pipe Finder and Leak Detector

FREE 16 PAGE BOOKLET UPON REQUEST

The M-SCOPE consists of a specially designed radio Transmitter and Receiver, with conductive wire. In operation, the Transmitter sends out a continuous signal, and when there is no metal between Transmitter and Receiver, a definite volume of sound is heard in the Receiver earphones and the meter (mounted on Receiver) gives a definite reading. If a metal object lies between the two units, sound in earphones is louder and meter reading higher—and the pipe or other metal object is located.

The M-SCOPE is solving — successfully — the varied problems involved in the development, operation and maintenance of buried pipe and cable systems and is in daily use by representative organizations in such important groups as:

- Government Projects
- Municipalities
- Sewerage and Water Plants
- Consulting Engineers
- Airports
- Public Utilities
- Industrial Plants
- Oil and Pipeline Companies

Write for further particulars and booklet:

FISHER RESEARCH LABORATORY

Direct Teletype PALO ALTO, CALIFORNIA

ever you like, you will be interested in **a.c.f. Full Pipe-Area Lubricated Plug Valves,** which have been effectively used in various locations in water and sewage plants. This bulletin may be obtained from the American Car and Foundry Co., Valve Dept., 30 Church St., New York, N. Y.

Included in the eight page bulletin are a list of advantages of the plug valve, facts on the operation of the valve, designs of the valves, tables of data, and information on multi-port, diamond-port and V-port arrangements. There is also a short section on a.c.f. lubricants for these valves.

* * *

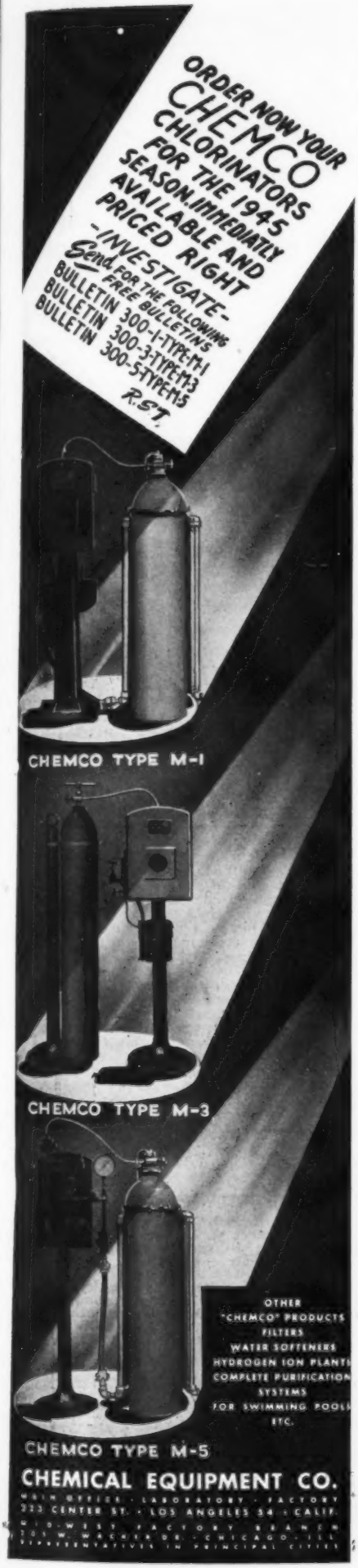
Deming Pumps Everywhere is a recent release from the Deming Pump Co. of Salem, Ohio. Included is a story of progress by Deming and a short history of the company. This is followed by pictures and short introductions to the various uses of Deming Pumps; for example, Agriculture, Farm and Suburban Homes, Factories, Mines and Quarries, Towns and Villages, Marine Industry, Aviation Industry, and others.

Under the section on Towns and Villages, mention is made of the use of Deming Pumps in water works. The pumps have also been used in water supply for sewage plants.

* * *

There's a little pocket-size catalog issued by the Pennsylvania Salt Co. of 1000 Widener Bldg., Philadelphia 7, Penna. It's called **Pennsalt Industrial Chemicals and Specialties** and contains ten pages of chemicals, most of which, we'll venture to say, you never heard of. Of course, there are the really Industrial Chemicals, then the Agricultural Chemicals, including the new DDT insecticide, and these are followed by the B-K chemicals (Bacteria-Kill), listing a number of prepared bactericides and insecticides (including Perchloron), of interest to water and sewage works.

Then there is the list of Laundry and Dry Cleaning Chemicals, including the alkaline detergents and bleaches, dry cleaning products, laundry blues and sours, and stain removers. Special chemicals include alkaline cleaners, solvent type cleaners, resin type corrosion-proof cements, silicate type corrosion-proof cements, stripping compounds, inhibitors, electroplating compounds, and pickling and descaling products.



You ought to write for this booklet. You might find something of interest for special problems, as for example that inhibitor to use in muriatic acid when you're acid washing vacuum filter cloths to increase their life.

* * *

Maybe *this* should be listed under equipment news, but inasmuch as it appeared in the *Taste and Odor Control Journal* of Industrial Chemical Sales Division (230 Park Ave., N. Y., N. Y.), it is going to be reported here. *This* is **A New Dry Feed Machine Made Up Specially for the Feeding of Activated Carbon in Water Purification Plants.** This dry feed machine was designed by Edward Engstrom, Filtration Plant Foreman, Fridley Filtration Plant, Minneapolis, Minn. The machine, which is completely described in the article, is completely enclosed, is mounted on a scale, and by means of a variable speed regulator can feed as low as eight or as high as 156 lb. per hour.

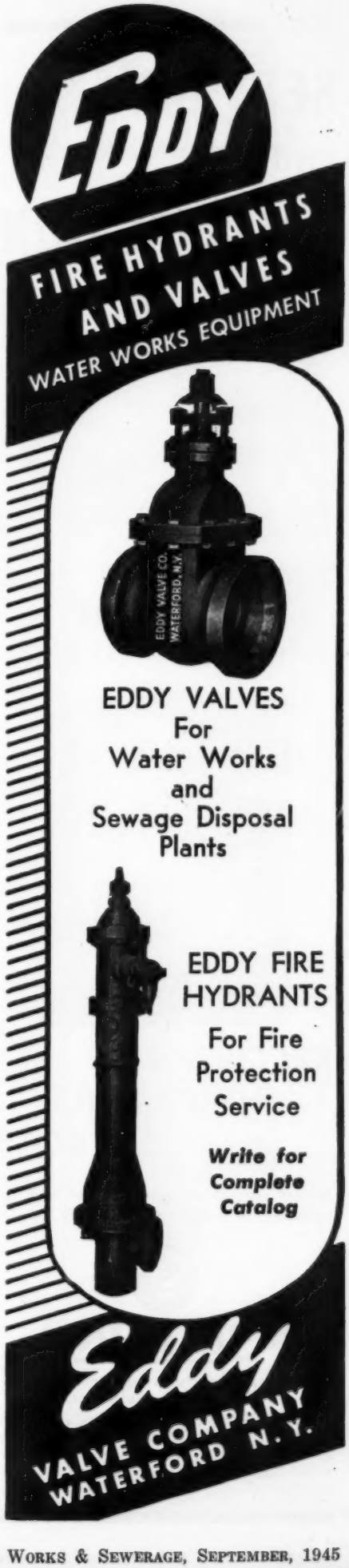
* * *

We were just about ready to write something about the August issue of the *Clay Pipe News* when an announcement came about the new clay pipe handbook, **Standard Vitrified Clay Pipe and Fittings,** issued by the Clay Sewer Pipe Assn., 50 W. Broad St., Columbus 15, Ohio.

This new handbook contains specific dimensional and specification reference data applicable to the full line of clay pipe and fittings. These dimensions and sizes have now all been standardized in cooperation with the U. S. Bureau of Standards. With the publication of this handbook, the new standard sizes and dimensions for clay pipe, carrying the A.S.T.M. designation of C-133-44-T and C-200-44-T. This handbook contains tabulated engineering information on all items in the standard and extra strength classifications. All tables of information are conveniently arranged. Copies of the handbook are available, free, on inquiry addressed to the Clay Sewer Pipe Assn.

* * *

For assurance of protection, according to the Buffalo Gasolene Motor Co. of 1280-90 Niagara St., Buffalo 13, N. Y., use **Buffalo Engines,** shown in Bulletin No. 317. This bulletin recently issued illustrates Buffalo gas and gasoline engine-generator units in various types of



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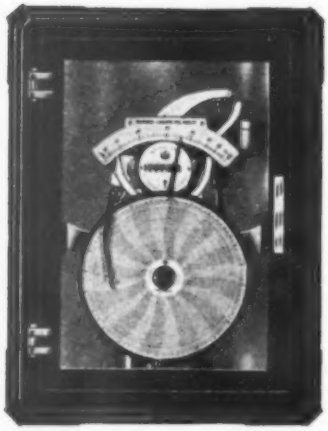
MAIN-LINE
METERS



RECORDERS
INDICATORS
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Meters for all main-lines 2-inch and up. Bulletin 308 comes upon request.

P. A. SPARLING

Manufacturer of Water Measuring Equipment.

LOS ANGELES 54..Box 3277 Terminal Annex
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services. The illustrations (with explanatory text) show sewage works, flood control, water works, fire protection, movable bridges, and communications.

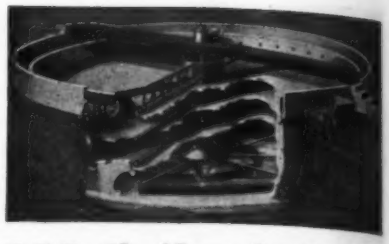
In the sewage works category, pictures show units operating on gasoline and others operating on sewage gas. In the water works, the engines are shown operating pumps of different sizes and types. This bulletin may be obtained by writing the company's Buffalo or New York office.

* * *

Now that World War II is over, there may be a number of persons who won't be interested in **Cast Iron Pipe at War.** They'll probably be more interested in cast iron pipe at peace. Nevertheless, the July issue of *Cast Iron Pipe News*, which was devoted to the subject of C. I. Pipe at war, is a volume worth having not only for its pictorial depiction of the many uses of C. I. pipe in war service and the industries concerned therewith, but also for some of the very interesting information it contains. Did you know, for example, that to produce one B-29 required 28 million gallons of water, and even aviation gasoline required 25 gal. of water for each gallon of gasoline produced (and there was an "awful" lot produced). Yes, sir, the figures given certainly underscore the tremendous part that water played in winning this war. This special issue may be obtained from the Cast Iron Pipe Research Assn., Peoples Gas Bldg., Chicago 3, Ill.

* * *

When you want to know where to obtain something it is a good idea to have a catalog handy, and if you have any occasion to buy chemicals, it might be well if you had Hooker's **General Product List** handy. This Bulletin, No. 100, is a file size folder containing brief information on nearly 100 chemicals. Data included are description, chief uses, and shipping container information. Several new chemicals are listed for the first time in this edition. Write Hooker Electrochemical Co. at Niagara Falls, New York City, Tacoma, Wash., or Wilmington, Calif.



P.F.T. Clarifiers for Rapid Precipitation of Sewage Solids

The P.F.T. Tray Clarifier embodies a design which affects the continuous rapid separation of the solids and liquid in sewage; and the immediate removal of the clarified effluent. A series of shallow settling areas over which the sewage is spread assures speedy precipitation. Its high rate of flow provides maximum capacity in minimum space; reducing the construction and operating costs of clarification equipment.

Write for Bulletin No. 210 containing complete information, including operating results.

P. F. T. **Pacific Flush-Tank Company**
4241 Ravenswood Ave., Chicago, Ill.
New York Charlotte, N. C

EXCEPTIONAL OPPORTUNITY—For a well qualified, practical waterworks man of general all around ability for a new position in our new Machinery Division. In the beginning the work will be principally in the office handling technical correspondence on the Palmer Surface Wash System, the new Overhead Drive Flocculation Equipment, the Adjustable Venturi Throat Distributing Wall, Electronic Water Purifier, Activated Alum, Black Alum, etc. In addition the new position will involve some interesting field work. State qualifications, experience, references, salary. Confidential. Write Stuart-Brumley Corporation, 516 N. Charles St., Baltimore 1, Maryland.

POSITION WANTED

ARMY AIR FORCE OFFICER—Sales Engineer desires connection with established manufacturer. Army assignments in procurement and development of electronic equipment; pre-war experience sales, service and installations of waterworks and sewage treatment equipment, pumps, flowmeters and industrial instruments. Please reply to Box J. J. L., % Waterworks and Sewerage, 155 E. 44th St., New York 17, N. Y.

Position Wanted as Sales Engineer. Have thorough knowledge of water and sewage equipment and until taking up war work was in sales field covering Middle West for major equipment manufacturers. Civil engineer with 20 years general practice, 6 years devoted to design and construction. Box 1050, Water Works and Sewerage, 330 S. Wells Street, Chicago 6, Ill.

PRACTICAL SANITARY ENGINEER: 11 years' experience operating and maintaining water and sewage plants. 10 years responsible supervisory and research positions. Proven organizer, best references. Desires position as water or (preferably) sewage treatment supervisor. Prefer south, especially Florida. Now employed, release on 15-day notice. Box 1060, % Water Works and Sewerage, 330 So. Wells street, Chicago 6, Ill.

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Mr. Sanitary Engineer:

THIS PRESSURE RELIEF & VACUUM BREAKER VALVE SHOULD BE WORKING FOR YOU

Tested - Approved - Guaranteed

The Safe Venting of Gas with the least maintenance is the job this valve performs, 24 hours a day, year in and year out. The efficiency and economy of thousands of installations throughout the world, plus years of research, have made "VAREC" approved Sewage Gas Control and Safety Devices the "Pace Setter Since 1928."

Why don't you let this unit work for you?

"VAREC" Approved PRODUCTS
Flame Trap Assembly, Pressure Relief and Vacuum Breaker Valves, Flame Arresters, Waste Gas Burners, Flame Checks, Regulators, Check Valves, Sediment Traps, Drip Traps, Manometers, Explosion Relief Valves, Handhole Covers, and Sampling Hatches.

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Agencies Everywhere

Automatic Control Valve Specialties, Pressure Regulating Valves, Hydraulic Booster Pumps, Feed Water Filters is the rather long title to Catalog 45 of the Ross Valve Mfg. Co., Inc., of Troy, N. Y., but then it's a rather big book, so it can stand a big title, and we don't mean to be facetious. That title really tells what is in this 96 page catalog, which contains pictures, dimensions, specifications, etc., on altitude valves, back pressure valves, check valves, combination valves, float valves, pressure reducing valves, surge valves, throat valves, and other valves, as well as booster pumps, water motors, pipe layouts, feed water filters, grease extractors, etc. If you need any valves of the type mentioned in your water or sewage plant, you should certainly look through this catalog, which may be obtained by writing the Ross Valve Co. at Troy, N. Y.

* * *

No, little Rollo, **Sterling Engines, Stationary and Marine,** are not silver plated, but they are made by the Sterling Engine Co. of Buffalo 13, N. Y., whose diesel, gasoline and gas engines have found wide use in water and sewage works. These stationary engines include the Petrel, the Viking, and the Admiral, all six-cylinder jobs, and the Admiral supercharged 12-cylinder model. Then there are the Viking six and eight-cylinder Diesel models. This catalog, which may be obtained by writing the company, contains tables showing the developed horsepower of these engines at different rpm. Also shown are pictures of installations of these engines driving standby generators or pumps in water and sewage plants. Marine engines are included in the catalog.

* * *

Among the catalogs stamped "New Literature" which arrived at our desk recently was one from the Ideal Commutator Dresser Co., of Sycamore, Ill. This catalog of 36 pages, printed on good paper stock, is titled **Modern Motor - Generator Maintenance and Repair Equipment** for Reconditioning War Weary Machines.

From time to time in the past we have mentioned in these columns some of Ideal's equipment or catalogs, but until we saw this catalog we never realized just how many things Ideal makes, nor how many were of interest to water and sew-

· 1879 ·
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AUTOMATIC VALVES

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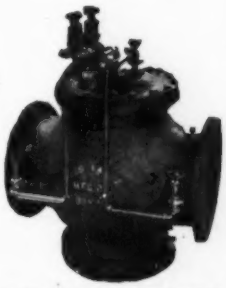
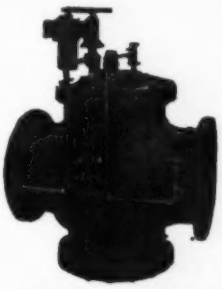
Control of elevation and heads into and out of tanks, basins and reservoirs, hydraulic control.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.
4. Can be equipped with electric and manual controls.



COMBINATION VALVE
This valve will permit flow in one or both directions acting as
1. Pressure Reducing and Relief Valve.
2. Pressure Reducing and Altitude Valve.
3. Relief and Altitude Valve.



REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

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INCORPORATED
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HYDRO-TITE — The self-caulking joint compound that makes cast iron water pipe joints — strong — tight — flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

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FIBREX — The sanitary paper packing that is used like braided jute. Free from bacteria — treated with a water repellent — put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

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PIPE JOINT COMPOUNDS

'BESTOLIFE Compounds have been used successfully for years in Water Works and Sewerage plants.

They obtain their effective anti-corrosion sealing characteristics from the metallic lead base of the compounds.

Use 'BESTOLIFE Compounds on water, oil, gas and gasoline lines; all threaded connections in valves, hydrants, pumps, engines, air compressors, etc., and on all studs and bolts. Also recommended for meter repairing.

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age works. The table of contents lists 50 or so items from Air Gap Gauges to Wire Strippers and Cutters. In addition the catalog contains Hints on Commutator Care and Commutator Troubles and Remedies. We'll venture to say that even if you don't repair your own motors and generators, there is something in this catalog that will be of interest to you.

* * *

Just on the outside chance that you may be lining a chemical tank or laying a brick sewer, we are mentioning **Quigly Acid-Proof Cements,** Bull. No. A.P. 122, of Quigly Co., Inc., 527 Fifth Ave., New York 17, N. Y. This new bulletin tells all about these acid-proof cements for effectively bonding and repairing acid-resisting masonry structures.

* * *

We received two bulletins recently from the Bailey Meter Co., Cleveland 10, Ohio, and one of them is of particular interest to all of you fellows who have problems of measuring the flow of sewage, industrial wastes, sludge, or irrigation water. Write for Bulletin 62, **Bailey Open Channel Meters,** and read about both direct mechanical and electronic telemeter type meters. The bulletin also illustrates a wide selection of registers having various combinations of indicating, recording, and integrating features. Alternate methods for mounting registers on wall, panel, and pedestal are also shown. All types of registers are said to be suitable for use with flumes, weirs, and atmospheric discharge nozzles.

The other 8-page bulletin, No. 83-C, is titled **Bailey Hydraulic Feed Water Regulators** and describes and illustrates improved designs in thermo-hydraulic generators and bellows-operated feed water regulator valves.

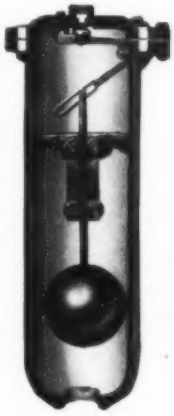
* * *

Within a two week period recently we received six catalog releases from Fischer and Porter, County Line Rd., Hatboro, Penna. Now all of these items are of interest, but in a limited space it is impossible to give even a short review of them. Best we can do is to name them and suggest that you write for those in which you are interested.

There are Bulletins 82-A and 83-A, which concern the new **Rotasleeve for Measuring Large Flows.** Catalog Section 43-E, which supersedes 43-D, is titled **Armored Rotameters.** The third, revised edition

CRISPIN SEWER VALVES

A NEW Pressure Air Release Valve for Sewer Lines



Designed by Crispin, a well-known name in Air Valves for Water Works systems, this new Valve for sewer lines will automatically relieve accumulating air and gases from force mains and other sewage equipment. It is suitable for all pressures up to and including 175 lbs. per square inch.

Outstanding features of the design permit a tight air seal at the top, with the float, actuating the levers, well away from working parts, thereby preventing sludge and other foreign matter from clogging the working parts. The ball rod runs through rollers permitting free action of the float without undue friction.

Inlet sizes are as follows: 2" scr. or flgd., 3" ditto, 4" ditto, 6" flgd. only.

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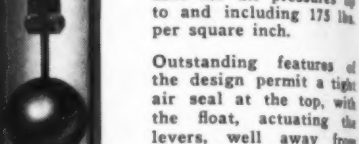

A.W.W.A.

VOGT BROTHERS MFG. CO. Incorporated LOUISVILLE, KY.
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VOGT
VOGT MFG. CO., Incorporated
P. O. BOX 1122 LOUISVILLE, KY.

AERO-MIX

AERATOR—MIXER

A Size and Type to Fit Your Problem in Water or Sewage Treatment.

WRITE FOR INFORMATION

of **A New Era in Flow Rate Measurement** is Catalog Section 10-C and supersedes Cat. 10-B.

One catalog section (98-Y) that should be in every engineer's file is the bulletin on the **Theory of the Rotameter.** Also included in the recent releases is a **Rotameter Nomograph for Steam.**

When you write for any or all of these catalogs be sure to say that *Water Works & Sewerage* suggested it, as Fischer and Porter like to know where you heard about their catalogs.

* * *

We have just received from Brown and Brown, Inc. of Lima, Ohio, a complete set of new **Tide Gate Bulletins.** These single page bulletins, Nos. 69 to 76 inclusive show various types, circular, rectangular and cushioned installations, as well as loss of head curves.

* * *

The Nature of Active Carbon is presented by John W. Hassler and William E. McMinn, of the West Virginia Pulp and Paper Co., in the July issue of *Industrial Engineering Chemistry.* In it Messrs. Hassler and McMinn tell how "carbon is activated by mild oxidation with steam or CO_2 at 800-950° C. or air at lower temperatures. Individual modifications of the basic process leave characteristic imprints on adsorptive properties. Specific compounds are adsorbed on appropriate active centers. Various species of active centers coexist on the carbon surface, and the over-all adsorptive power of the parent carbon is a function of the quantity and ratio of the different species. Evidence is found in several experimental approaches as follows: (1) the relation of activation time and methods to the development of specific adsorptive, and (2) the influence of prolonged grinding, chemical agents and the solvent on existing adsorptive powers."

* * *

Here's a newcomer on the scene of **Concrete Restoration,** that being the title of a bulletin issued by Hudson-Rumsey Co., Inc., of 1200 Niagara St., Buffalo 13, N. Y. The bulletin shows a number of locations where concrete has been restored by the process used by the Hudson-Rumsey Co. Included are water tank foundations, bridges, dam gates, buildings, and so forth. The bulletin is available upon request.

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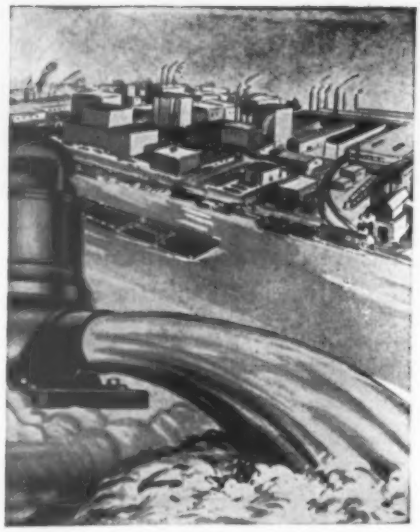

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